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Cost of Milk Production on 138 Louisiana Dairies.

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COST OF MILK PRODUCTION ON 138 LOUISIANA DAIRIES

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ABSTRACT

Numerous economic reports show that costs of producing milk have increased at a rapid pace since World War II. Contributing to this increase has been the rising costs of the factors of production. During this same time, prices received for milk by Louisiana dairymen have not increased but, in many cases, have decreased. This development has resulted in a "price squeeze" for dairymen, and economic adjustments have become necessary. This study was made to determine investment, labor, and size of operation necessary for a family size dairy unit in Louisiana.

Business analysis records for 1957 on 138 Louisiana dairy herds enrolled in Extension's Farm and Home Development program were used as basic data in this study. The herds were located in 14 parishes and represented four geographical sections of Louisiana. Expense and income records were obtained from the farmers by the Agricultural Extension agents in the parishes and were authenticated by sales slips, canceled checks and receipts. Since no records were available, total hours of labor were estimated by the agents.

For the major analytical purposes three cost categories were used: i.e. (1) cash costs, (2) cash costs plus depreciation on buildings (four per cent per year), equipment (eight per cent per year) and interest on investment (four per cent per year) and (3) total costs, which included (2), above, plus the value of unpaid family and operator's labor (at 50 cents per hour).

Most of the costs were related to total pounds of milk produced

per farm per year, and various cost comparisons were made on the basis of 100 pounds of milk produced. The statistical method used was linear regression. Weighted averages were used in computing costs as related to average production per cow, number of cows in the herds, and per cent distribution of production costs.

Average total costs of producing milk on the 138 dairy farms was $5.47 per 100 pounds as compared to $5.54, the average price received for the milk. This shows that the industry was close to an economic "equilibrium" during 1957. A minimum production of 178,000 pounds of milk annually was necessary before total milk receipts equaled total costs, whereas only 135,000 pounds must be produced in order for gross returns to the dairy to equal total production costs. Fixed costs declined and variable costs increased as production per year increased. The data indicated that better use of the factors of production could be made when a minimum of about 200,000 pounds of milk was produced annually. Investment per 100 pounds of milk produced decreased as production per year increased. In the distribution of costs, purchased feed constituted the largest item in either cash costs (49.29 per cent), cash costs plus depreciation and interest on investment (40.19 per cent) or total costs (33.33 per cent). Value of all labor (paid and unpaid) comprised 22.34 per cent of total production costs. Total hours of labor varied greatly between herds at each level of annual production. This variation indicates that many dairy operators are not making the best use of labor.

According to these data, a family size dairy unit in Louisiana must have a minimum of about 35 cows averaging approximately 5,000 pounds

of milk per cow per year in order to produce enough milk, have enough volume to overcome "overhead" costs, and produce a fair labor income for the family.

CHAPTER I

INTRODUCTION

The dairy industry has grown rapidly in Louisiana since World War II. In 1945, approximately 150,000 dairy cattle on 4,900 commercial dairy farms in Louisiana produced 693,000,000 pounds of milk which was sold to processing plants for approximately $28,000,000.[1/] By 1957 over 739,000,000 pounds of milk valued at $48,000,000 was sold from 4,600 commercial dairy herds in the state. In 1957 there were approximately 230,000 dairy cows on commercial dairy farms in Louisiana. During the twelve year period (1945-1957), milk production increased about 22 per cent and the value of milk sold increased nearly 100 per cent. At the same time the number of producers and cows on farms remained relatively constant. A large per cent of the increase in production per cow is due to improved production practices employed by the producers in the state, including the state wide artificial breeding program, increased use of quality forages, improved methods of raising dairy replacements and better disease and parasite control.

Enough milk was produced in Louisiana during 1957 to meet fluid milk needs had it been produced in equal amounts each month. Some milk was imported during the fall and winter months and some milk was used in Class II and III during other seasons of the year.[2/]

[1/] Dairy Statistics, U.S.D.A., Statistical Bulletin No. 218, October 1957, pp. 26.

[2/] Class I milk is milk used for bottling purposes and demands the highest price. Class II and III milk is that which is used for production of milk products.

Less than five per cent of some of the dairy products consumed in Louisiana, such as ice cream, butter, cheese and powdered milk, were produced in the state in 1957.

Because of rapid changes in the economy a number of adjustments are being made on dairy farms in Louisiana. Higher costs for feed, machinery, land, marketing, and farm wages are forcing many dairymen to be more efficient.3/ In an effort to produce milk more efficiently, some dairymen in Louisiana are increasing the size of the dairy enterprise. Improved arrangements of work space and work methods along with improved dairy equipment have permitted an increase in size of herd without additional labor requirements and even a possible reduction on some farms. The feed supply for the enlarged herd on some farms may come from the same acreage with improved cropping and pasture practices, new crop varities, the use of additional fertilizer, and improved methods of management.

Among technological developments, artificial breeding has made a great contribution by increasing the inheritance for increased production in the animals. Reductions in the work load have come from such developments as parlor milking, pipelines that can be cleaned in place, bulk tanks, mechanical feeders, and field choppers. New insecticides for control of flies and other pests have contributed to increased production. Improvement in refrigeration together with availability of electricity have done much to improve quality of milk. Bulk handling of milk has reduced labor and, in many instances, improved quality.

3/L. A. Moore, "Horizons in Dairy Production," Mimeograph, U.S.D.A. ARS 44-34, October, 1958, pp. 2.

In Louisiana, ninety-nine per cent of the cows in commercial herds are milked with machines. Nearly fifty per cent of the producers have bulk tanks and approximately 25 per cent have pipeline milkers. Most of the dairy producers have at least one tractor, along with other farm equipment. Many have trucks, silage harvesters, and hay equipment. Investments and costs of producing milk are continuing to increase while the price farmers receive is not increasing in the same proportion. If continued profits are to be obtained, production costs must be lowered.

More information is needed in Louisiana on costs of milk production, labor requirements, and the quanity of milk that must be produced per cow and per dairy so that specific recommendations can be given farmers in an effort to help them adjust to changing economic conditions.

CHAPTER II

STATEMENT OF PROBLEM

Mechanization in commercial dairy production in Louisiana has progressed rapidly during the past ten to fifteen years. Milking machines are now used by 99 per cent of the dairymen. Many have installed pipeline milkers and milking parlor type barns. Nearly half of the producers in the state are now using bulk tanks. Tractor power along with mechanical silage and/or hay equipment is being used on most dairy farms in the state.

With mechanization, investment requirements have materially increased. This suggests that a larger volume of milk is necessary for each farm in order to meet increased overhead expenses. Increasing the size of the herd has become necessary for many commercial dairymen so they can take advantage of "economies of scale" and more efficiently utilize their factors of production. Because of competition and the "price squeeze", dairymen are being encouraged to produce more milk per cow in an effort to increase efficiency.

Costs of most of the factors of production that dairymen must buy have increased (from 1940 to 1957) from 25 to 250 per cent, while the price paid the producer has remained about the same and in some cases even declined.[1/]

This study was initiated to determine the relationship between costs of milk production in Louisiana and selected factors related to

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[1/] The Farm Cost Situation, U.S.D.A., A.R.S. 43-87 (FCS - 25) November 1958, pp. 3.

costs. Analysis was made to determine the quantity of milk production necessary per farm to meet either cash expenses or total costs and to produce a return to the farm family for living. The following hypotheses were developed to guide this study:

(1) Investment, total costs, and labor requirements per 100 pounds of milk produced on Louisiana dairy farms decreases as the size of the dairy enterprise increases.

(2) A forty cow herd represents an economical family size dairy enterprise in Louisiana.

(3) Production per cow for an efficient, economic size dairy unit in Louisiana must average a minimum of 6,000 pounds of milk annually.

(4) A minimum of 200,000 pounds of milk must be produced per dairy annually for an efficient economic unit.

CHAPTER III

REVIEW OF LITERATURE

Importance of the Dairy Industry

In 1940, U.S.D.A. reported that 10.7 persons in the United States were supported by one farm worker as compared to 19.8 persons in 1955 (22). During this same period, (1940-1955) prices paid by farmers increased more than two times as compared with 1935-39. Wage rates are nearly five times as high and prices of power and machinery have more than doubled (21). During the period 1940-1959 prices received by farmers have not increased in proportion to costs of production.

Dairying was the largest single agricultural industry in the United States in 1954 measured in terms of value of products sold. The sale of milk was valued at 4.8 billion dollars as compared to 4.4 billion for cattle and calves, 4.2 billion for corn and 2.4 billion for cotton. Nationally, the dairy industry ranks on an annual gross income basis with American Telephone and Telegraph, and U. S. Steel. Efficiency in dairy production has increased rapidly during the past 15 years as in other types of farm production (10). Undoubtedly much progress can still be made on many farms.

Investments in Dairying

Total investment on dairy farms has been rising rapidly during the past 20 years because of mechanization and the increasing size of the dairy unit. Of course some of the dollar increase has also been due to inflation, as well as an increase in actual values of some of the production factors.

Bolton and Wiegmann (1) in 1955 showed that total investment per farm was $21,000 at an average output of 284 pounds of milk per day, as compared to $29,000 total investment for dairies producing 600 pounds of milk per day. Their data indicated that the smaller farms were over invested in the various items of capital, and in labor. Parvin and Tramel (14) showed that average investments on Grade A dairy farms in Southwest Mississippi in 1952 was $22,943. This was an investment per cow of about $460. In the Mississippi study, investment per cow decreased as the size of herd increased. Shultis (18) reported an average investment of $967.19 per cow for a 130 cow, Grade A, dairy herd in the San Joaquin Valley in California in 1957. In Florida, the value of the land was the largest factor affecting the average investment per cows on dairy farms. Spurlark, Brooke and Greene (19) reported that the average investment per cow on dairy farms in Florida varied from $322 to $424 per cow in 1949. Land values varied from $72 to $162 per cow. Criswell and Bondurant (3) reported that the average dairy farm investment in Pulaski and Wayne counties in Kentucky in 1953 was $16,691 per farm with an average of 12 cows per farm. This was an average investment of over $1,390 per cow. Leonard (8) reported that in 1955, 48 Missouri farms had an average of 25 cows per farm and an average investment of $34,936. In 1956, 41 Missouri farms had an average investment of $38,936 for 26 cows. This is an average investment of over $1,400 per cow.

Costs of Milk Production

Costs of milk production are difficult to arrive at due in part

to the differences in investments on farms and different management conditions. Also costs of production are continually changing in relation to changes in variable costs and prices received by the producers. In New York, Cunningham (5) reported that costs per 100 pounds of milk production in 1957 were $6.68 in herds averaging 4,933 pounds of milk annually, $4.89 in herds averaging 7,441 pounds, and $3.74 in herds that average 9,429 pounds of milk per cow annually. A similar cost of milk production in Louisiana was reported by Bolton and Wiegmann (1), who showed that in 1955 in herds that average 6,012 pounds of milk per cow annually, costs of production were less than $4.00 per cwt. In herds where the average production per cow per year was 3,507 pounds, the cost per 100 pounds of milk produced ranged from $8.00 to $9.99. Ranney (16) showed that total costs of milk production in Tennessee in 1957 were $6.69 per 100 pounds where cows produced from 2,000 to 3,999 pounds of milk per cow, $4.48 where the average production ranged between 4,000 and 5,999 pounds of milk annually and $3.86 for those herds that averaged between 6,000 and 7,999 pounds.

Labor Requirements

During the past 15 years, a large amount of labor saving equipment has been developed and put to use on dairy farms. Included in these labor saving items are improved milking machines, milking "parlors", pipeline milkers, bulk tanks and improved farm machinery. This has resulted in less labor inputs of each 100 pounds of milk produced on some farms. Improved inheritance and better feeding and management practices have also

contributed to improved labor use.

In North Carolina Pierce and Pugh (15) estimated that 3415.9 man hours per year would be necessary for a 20-cow dairy herd producing Grade A milk in 1956. This is an average of over 9 hours per day for the twelve month period. The man labor estimates were broken down into 575.9 hours for crop production and 2,840 hours for dairy production labor. Parvin and Tramel (14) reported that labor used per cow decreased from 123 hours per cow for herds averaging 25 cows to 87 hours per cow for herds averaging 75 cows in Northwest Mississippi in 1952. In Southwest Mississippi the decrease was from 201 hours per cow for herds averaging 10 cows to 129 hours per cow for herds averaging 20 cows. Suter (20) reported in Montana in 1952 that as the number of animal units per man increased from 17 to 32.6, the operator's labor income increased from $1,700 to $3,617. He, also, reported that a strong relationship usually exists between milk sold per man and labor income. In Central Missouri, as the amount of milk sold per man increased from 44,751 pounds to 108,500 pounds the return to the operator increased from $1,768 to $4,110 (8). Studies in California (17) show that 85 hours of labor per cow were necessary in 1952 as compared to about 120 hours in 1942. Better equipment, smaller more compact milking barns and greater use of pasture all contributed to this reduction in labor requirement. Cunningham (4) reported that on 556 dairy farms studied labor requirements averaged 118 hours per cow per year. Low output of milk per man meant a high cost of milk. Conversely, high output per man resulted in a low cost. An average cost of $6.25 per 100 pounds of milk was found on the farms from which less than 50,000 pounds of milk was sold per man. Average costs were only

$3.40 per 100 pounds on farms which sold 200,000 pounds or more per man.

Feed Requirements

It is almost universally agreed that dairy cattle should obtain from 75 to 80 per cent of total digestable nutrients in the form of forage crops (10). The rates most often recommended for feeding concentrates are one pound of concentrates for each three pounds of milk produced by the small breeds, and a ratio of one to four for the larger breeds. Butler (2) estimated that 75 per cent of the total digestable nutrients could be supplied from grazing crops. This agrees with recommendations in Louisiana (12) that from 75 to 85 per cent of the total digestable nutrients in a dairy ration should be obtained in the form of roughages. Morrison (11) reports that the combined cost of feed and bedding is by far the largest single item of expense, generally forming from one-half to two-thirds of the total cost of milk production. This expense varies widely depending on the price of feeds, the average production of the herds, and the economy of the rations used.

DHIA records in Louisiana (13) show that average costs were $51 for roughage and $83 for concentrates for 293 cows in 1957. This was a total feed cost of $134 out of a gross return of $285 per cow, or 49 per cent of the average gross returns. Ranney (16) showed that feed costs varied in Tennessee from $1.96 per cwt. in the 8,000 to 10,245 pound herds to $3.52 in herds averaging between 2,000 and 3,999 pounds of milk per cow annually in 1957. The average feed cost per 100 pounds of milk produced for all 93 farms in the study was $2.23. This was considerably

less than the Louisiana study (1), where in 1955 average feed costs were $3.40 per 100 pounds of milk produced.

CHAPTER IV

THE THEORY OF COSTS

The economic evolution that has been taking place in Agriculture for the past fifteen years is increasing the need for better management by farm operators. More attention is being required in the application of business principles in dairy farming. Because of high investments, rising production costs and the use of improved equipment and methods, a knowledge of the relationship of costs to profits is becoming increasingly necessary for farm managers to make intelligent decisions. The following is a formal outline of the theory underlying this study of costs in milk production.

Total Costs

Total costs of production generally refers to the complete money costs of producing some saleable product. It is the summation of total variable and fixed costs. Due defines costs as "the compensations which must be received by the owners of units of the factors of production and money capital used by a firm if they are to continue to supply the units to the firm."[1/] Production costs are essentially quantities of factors of production that have been converted into monetary terms.

Costs of production fall into two general categories, fixed and variable.

1/John F. Due, Intermediate Economic Analysis (Homewood, Illinois Richard D. Irwin, Inc., 1956) p. 148.

Fixed Costs

Fixed costs are those that remain the same over a period of time, regardless of output, and over which the manager has no control, once they are committed to business. Investments which lead to fixed costs in agricultural businesses include land, buildings, equipment and livestock. Real estate taxes, rent on factors of production, and interest on capital for the use of certain resources which are fixed over a specified period of time, are classified as fixed costs. (Fixed costs in agriculture are relatively high in comparison with variable costs.) As the units of output increase, fixed costs are spread over more units so that fixed costs per unit of output become smaller.

Variable Costs

As with fixed costs, the variable cost per unit of output also decreases, as output increases, for a short period. Of course this varies with the industry and enterprises involved. It then increases for additional units of output. The initial decrease in variable costs is because certain factors of production are used more efficiently as output is increased. Labor is more efficient, in that it becomes more specialized, and a larger amount of the product is produced in the same amount of time with the same amount of labor. Also, machines are more efficiently used when operated at near capacity level where the amount of additional output is greater than the proportionate amount of increase in the factors used for operation, thereby bringing about a lower cost per unit of production.

Eventually, however, a point is reached where smaller amounts of output are derived from the same expenditure for variable factors. Larger amounts of the variable factor per unit of production then become necessary. This results in an increase in the variable costs per unit as the output becomes larger.

Marginal Costs

Marginal costs are often used in cost analysis. The marginal cost of production is the addition to total cost for one additional unit of output. The marginal cost concept furnishes a guide as to the most profitable level at which to produce. To obtain maximum profit, production should be continued until marginal costs equal marginal returns. As long as additional revenue from increased output exceeds the costs of inputs, continued production is profitable. Production beyond this point will add more to total costs than is received in increased revenues and will, therefore, be unprofitable.

Total fixed and variable costs determine total costs. Once committed, the manager has little control over fixed costs and, therefore, variation in total costs depend largely on variable cost components. The use of variable cost items can be altered during the operation. Unfavorable prices can affect the amounts of variable cost factors that an operator may use. In cases where fixed costs are relatively high in proportion to variable costs, such as in most farming enterprises, producers may be forced to continue production even if total costs are not being covered. Since fixed costs continue whether the operation ceases or not

the manager may well continue to operate as long as revenue exceeds variable costs. Receipts in excess of variable costs can then be applied to offset fixed costs so that the business will lose less than if the operation ceased entirely. If, however, the returns from production do not at least equal total variable costs, losses will be minimized by ceasing to produce. A continued loss of a portion of the fixed costs would eventually force the producer into bankruptcy.

Cost Plus or Average Cost

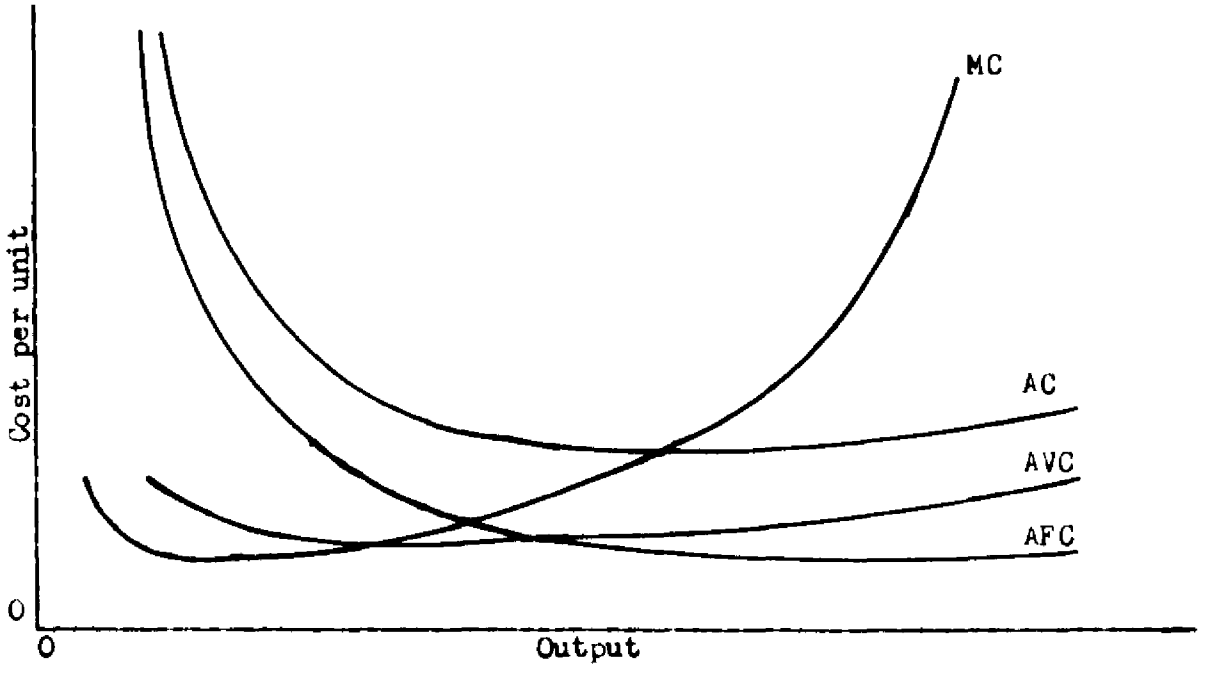
The "cost plus" or "average cost" approach is used by some firms in deviating from the marginal cost approach in analyzing costs. In some cases, it is difficult, because of the large number of products produced, to measure the marginal costs for various products. In some cases, common costs are involved where the first product produced increases another product. In average cost pricing, separate costs are determined as closely as possible. Common costs are then determined on a pro-rata basis. By adding separate and common costs, total costs can then be computed. In average cost pricing, profit maximization seldom occurs except by chance. Average cost pricing tends to stabilize competition but gives no cognizance to demand.

Relationships between short run costs are shown graphically in Figure I. Short run average costs are derived by dividing the respective fixed and variable costs for each output by the number of units of output. As the number of units of output increase, the average cost per unit of output decreases.

Average Total Costs

The average total cost curve provides the basic economic model for this study since it relates per unit cost to volume of production. The average total cost curve is the summation of the average fixed and average variable cost curves. Near the Y axis, the fixed cost curve per unit of output is infinitely high but decreases rapidly as output increases. The average total cost curve decreases in a similar manner to the average

Figure 1. Short-Run Cost Curves



fixed cost curve as production increases. As average variable cost per unit begins to increase, it becomes a greater portion of total costs, offsetting, somewhat, decreasing average fixed costs per unit output. With a continuation of increase in the average variable costs, their effect begins to outweigh the average fixed costs, resulting in an increase in the average total cost per unit. All this is shown in Figure 1.

As can be seen from Figure 1, average costs per unit of output decreases with each increase in output over a range. Then the curve levels off and begins to increase for larger output; thus resulting in a "U" shaped short run average total cost curve. Thus, it can be seen that the level of per unit costs of production are different depending on the quantity being produced.

As output increases, a degree of specialization in labor, management and other factors is attainable. This increases the efficiency of production and lowers the per unit cost. After continued increases in production, this trend is reversed and per unit costs increase. This is caused by a breakdown in management as production factors becoming unwieldy. After optimum use is being made of production factors, additional production will raise per unit cost and production will become less efficient.

Marginal Costs

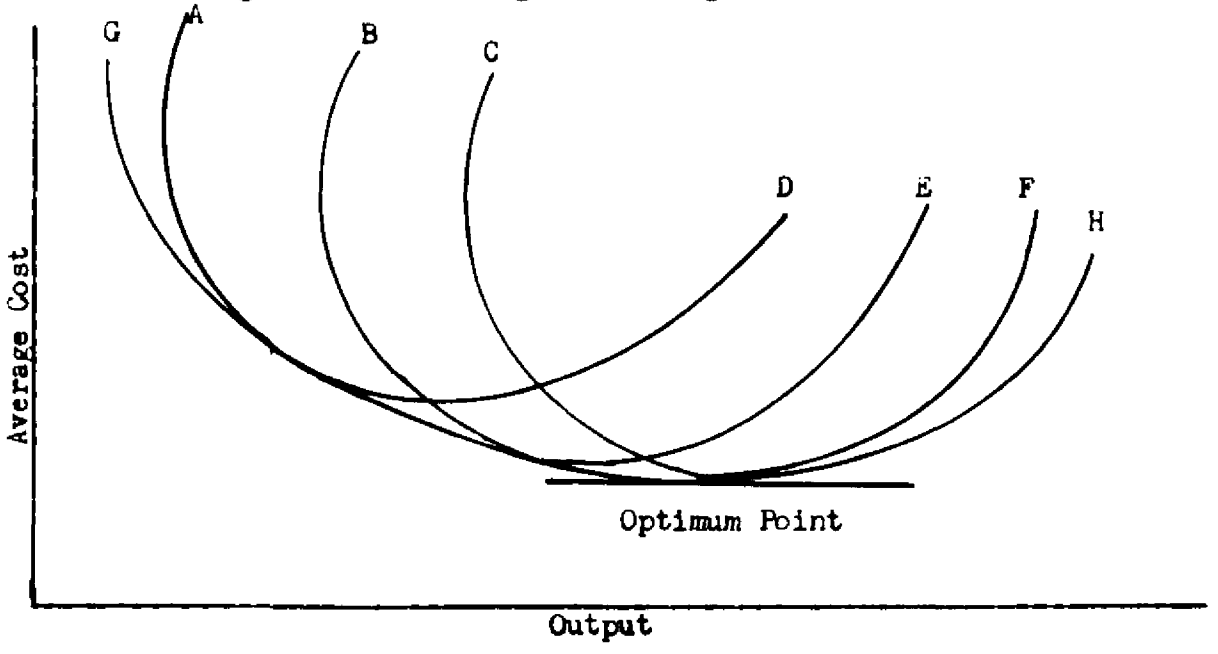
Marginal cost is the change in total cost from one added unit of input divided by the change in output. At first, as output increases, the cost of producing each additional unit decreases for a while. This is called the stage of "increasing returns" (or decreasing costs). While this is taking place, both the marginal and average cost curves decrease. With further increases in output, the marginal cost curve increases but the average variable cost curve continues to decrease as long as the marginal cost curve is below it. When the marginal cost curve intersects the average variable cost curve, the average variable cost curve begins

to rise. It does not rise as rapidly as the marginal cost curve, just as it did not decrease as rapidly. The marginal cost curve intersects the average variable cost curve and the average total cost curve at their lowest points. In both cases, they began to increase after the intersection with the marginal cost curve. While it is not usually formally recognized marginal costs are important in determining the most profitable level of combining variable factors (feed) to fixed producing units (cows).

Long Run Average Costs

Long run average costs differ from short run costs as can be seen in Figure 2. Actually, the long run average cost curve represents the

Figure 2. The Long-Run Average Cost Curve



minimum cost at which any given output can be produced. It is composed of segments of a number of short run average cost curves. These various short run curves (B E) and (C F) represent average costs of individual

plants at each level of output. The portion of the short run curve that is tangent to the long run average cost curve represents the minimum cost at which this particular output may be produced. To move to the minimum point on the curve B E would lower costs per unit of output, but at this level it would still be advantageous to move to a larger plant that would have a short run curve lower and further to the right than B E. The process of enlarging the plant can be continued until the lowest point on the long run average cost curve is reached.

Advantages of scale through specialization of labor, maximum use of equipment and machines, and utilization of by-products can be realized up to a point but these advantages do not continue indefinitely. The point is reached where they become disadvantageous, which explains the rising portion of the long run average total cost curve. The optimum point of operation is where the curve reaches the lowest point.

The long run average total cost curve is sometimes called the planning curve because it indicates the average costs that could be expected if the most economical plant were put into operation for each different level of output.

CHAPTER V

PROCEDURE

Source of Data

Business analysis and average inventory values for 1957[1] were taken on 138 dairy herds enrolled in the Louisiana Farm and Home Development Program, Table 1 and Figure 3. The dairy herds were located in 14

Table I - Distribution of Producers and Production by Size Groups, 138 Dairy Farms, Louisiana, 1957

Farm Size Group (Production per Year)	Number of Producers in Study	Per Cent of Producers in Group	Per Cent of Total Milk Produced by Group
Pounds of Milk	Number	Per Cent	Per Cent
50,000 - 100,000	16	11.59	4.91
100,001 - 150,000	40	28.99	20.16
150,001 - 200,000	32	23.19	21.69
200,001 - 250,000	23	16.67	20.30
250,001 - 300,000	16	11.59	16.88
300,001 - 350,000	5	3.62	6.42
over 350,000	6	4.35	9.64
Totals	138	100	100

parishes in Louisiana.[2] The schedules were completed by the author directly from information in the files of the agents in the parishes. The

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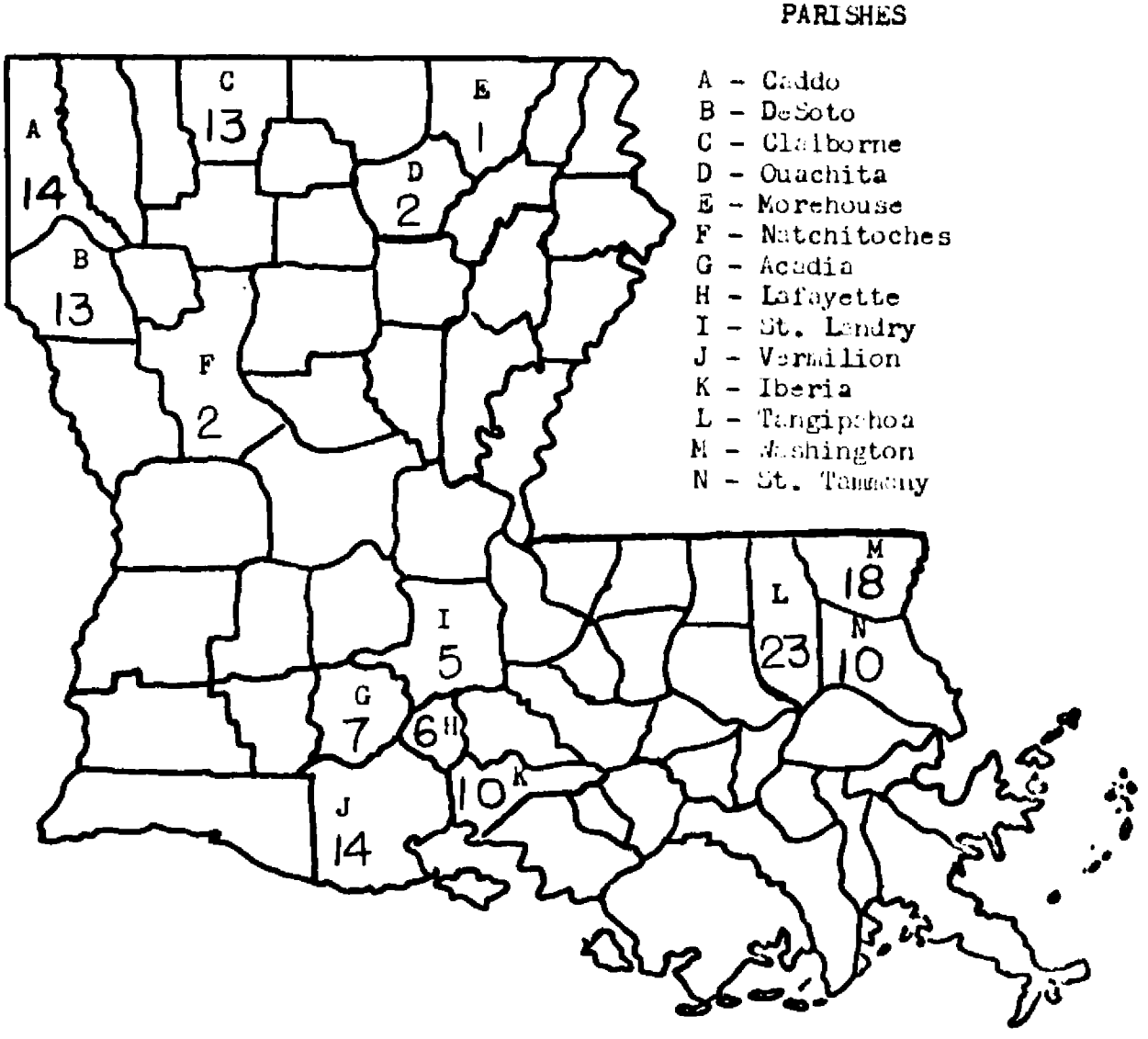
[1] See schedule Appendix A

[2] See Map page 21

Figure 3. Location and Number of Farms, 138 Dairy Farms, Louisiana, 1957



farm records are detailed and maintained in connection with the Farm and Home Program. Only specialized dairy farms were used in the study, except in cases where dairy costs and returns could definitely be identified and separated from other enterprises. The data had been obtained from the farmers by personal interview by the Extension agents and in most cases were verified by receipts or other records.

The schedule was divided into four sub-headings, namely: inventory, cash receipts, cash expenses, and labor used. Inventory values had been arrived at jointly by the farmers and Extension agents involved in the Farm and Home Development Program. Cash receipts and cash expenses were determined by actual records as reported to the Extension agents by the dairy farmers. Hours of labor on each farm was estimated by the Extension agents. As the Farm and Home Development agents work with only a limited number of farmers, their estimates of the actual labor by the operator and other unpaid family labor, were considered to be the most accurate estimate obtainable.

Accounting Method

Costs were broken down into the following three major categories for much of the analysis and discussion. These included: (1) cash costs, (2) cash costs plus depreciation on buildings and equipment and interest on investment, and (3) total production costs.

(1) Cash costs included items used in production of milk where actual cash expenditures were made each year. Some of these costs included expenditures for feed, labor, fertilizer, seed, utilities, milk

hauling, etc. In making management decisions many dairymen figure only on a cash cost basis, and fail to consider depreciation on buildings and equipment, interest on investment, and the value of unpaid family labor.

(2) Cash costs plus depreciation and interest includes all cash costs plus depreciation on farm buildings (excluding the operator's residence) at 4 per cent per year; farm equipment and machinery at 8 per cent per year; and interest on total investment at 4 per cent per year. After these costs have been deducted from total receipts, the remainder is income for family living and is often called "returns to labor and management." In the long run dairymen should consider the depreciation and interest charges, along with cash costs, in making management decisions.

(3) Total production costs included all charges listed in 1 and 2 above plus the value of unpaid family and operator's labor, valued at 50 cents per hour. After deducting total costs from total receipts, the remainder is returns to management. Where a large number of dairies are involved, the money left after total costs were deducted from gross returns could be related to the term "excess profits" of economic theory. Where excess profits exist the industry would not be in economic equilibrium and additional capital would be invested in the industry until costs and returns were equal and an economic equilibrium reached.

Costs were also related to average milk production per cow. It is a well known fact that expenses for keeping high producing cows are only a little more than for low producers. Many cost records are based on

milk production per cow.[3]

The per cent of costs expended for various expense items was also calculated for the three categories enumerated above, i.e. cash costs, cash costs plus depreciation and interest and total costs. These percentage figures may also serve as guides or "bench marks" for individual dairymen in analyzing their own individual costs.

Costs used in this study were also broken down into variable and fixed categories. Variable costs were enumerated under the following sub-headings; feed, fertiliser, seed, labor and "other" costs which included milk hauling, supplies, breeding fees, utilities, etc. Fixed costs included insurance, taxes, interest on borrowed capital, interest on investment and depreciation of buildings and equipment.

Cash costs included the variable costs listed above plus insurance, taxes and interest on borrowed capital.

Because of differences in methods of computing depreciation among the fourteen Extension agents who compiled the information, a standard depreciation of 8 per cent was figured for all equipment. The operator's residences were not included in the farm inventories due to the wide differences in values of homes on farms included in the study.[4] All other buildings and any silos on the farms were depreciated at 4 per cent.

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[3] Most U.S.D.A. records (including Dairy Herd Improvement and Weigh-a-Day-a-Month) are computed on the basis of average production per cow.

[4] Since values of farm homes were not included in the inventories, total investments are slightly lower than would otherwise be true.

Land values were computed on the basis of the average price paid for farm land during the years 1952 through 1956.[5/] Adjustments were made in prices paid for land in Iberia and St. Tammany parishes because of the great increase in land values in 1955 and 1956 (due to abnormal price increases associated with the purchase of land for a jet air base and the demand for land for rural residential purposes because of a new bridge across Lake Pontchartrain connecting St. Tammany and the city of New Orleans). Land was neither depreciated nor appreciated for this study.

Interest was charged at the rate of 4 per cent on the average inventory values for 1957. Inventory values had been jointly arrived at by the farmers involved and the Extension agents doing the Farm and Home Development work in the parishes.

As no unpaid family labor records were available, hours of labor were estimated by the Extension agents for each farm. They were asked to estimate only actual productive work carried on by the various workers. The operator's labor and all unpaid family labor was valued at 50 cents per hour. Dollar values for farm privileges were not computed in this study because of the difficulty of determining values. Farm privileges plus 50 cents per hour was considered to be a fair labor value.

Livestock were neither depreciated nor appreciated in this study. Expenses for raising replacements were included in farm expenses and animals sold as culls or for other reasons were credited to farm income.

5/ Burford M. Gile, Farm Real Estate Prices in Louisiana by Parishes, 1952-1956, L.S.U. Experiment Station, DAE Circular No. 206, June 1957, pp. 1-10.

Most of the herds were mixed having Holstein and Jersey cows with some Guernsey dispersed in a few herds. Practically no purebred animals were on the farms included in the study. Because of the size of the sample and difficulty of determination, breed differences were not taken into consideration.[6/] Also no attempt was made to standardize the per cent fat in the milk.

Statistical Method

Scatter diagrams were plotted relating various cost items to the size of the business. The nature of the scatter suggested a straight line (direct) positive relationship in terms of total costs (inverse in terms of unit costs). Regression methods were used to fit straight lines to the data ($Y = A + BX$) where Y = the dependent variable, X = the independent variable, "a" = the Y intercept and "b" = slope. "a" and "b" coefficients were obtained by simple linear regression as shown for various relationships in Appendix Table C. Snedecor's "t" test was used to determine whether the coefficients differed significantly from zero.

6/The author recognizes that milk from the smaller breeds sells for more than lower fat milk from larger breeds of dairy cattle.

CHAPTER VI

ANALYSIS OF COSTS

Costs of production were studied in terms of the following categories related to size of operation as measured by annual milk production: total costs, average costs, per cent distribution of costs, and fixed and variable costs. Some costs were also related to size of milking herd and average production per cow within the herds in the study.

Investment and Labor Requirements

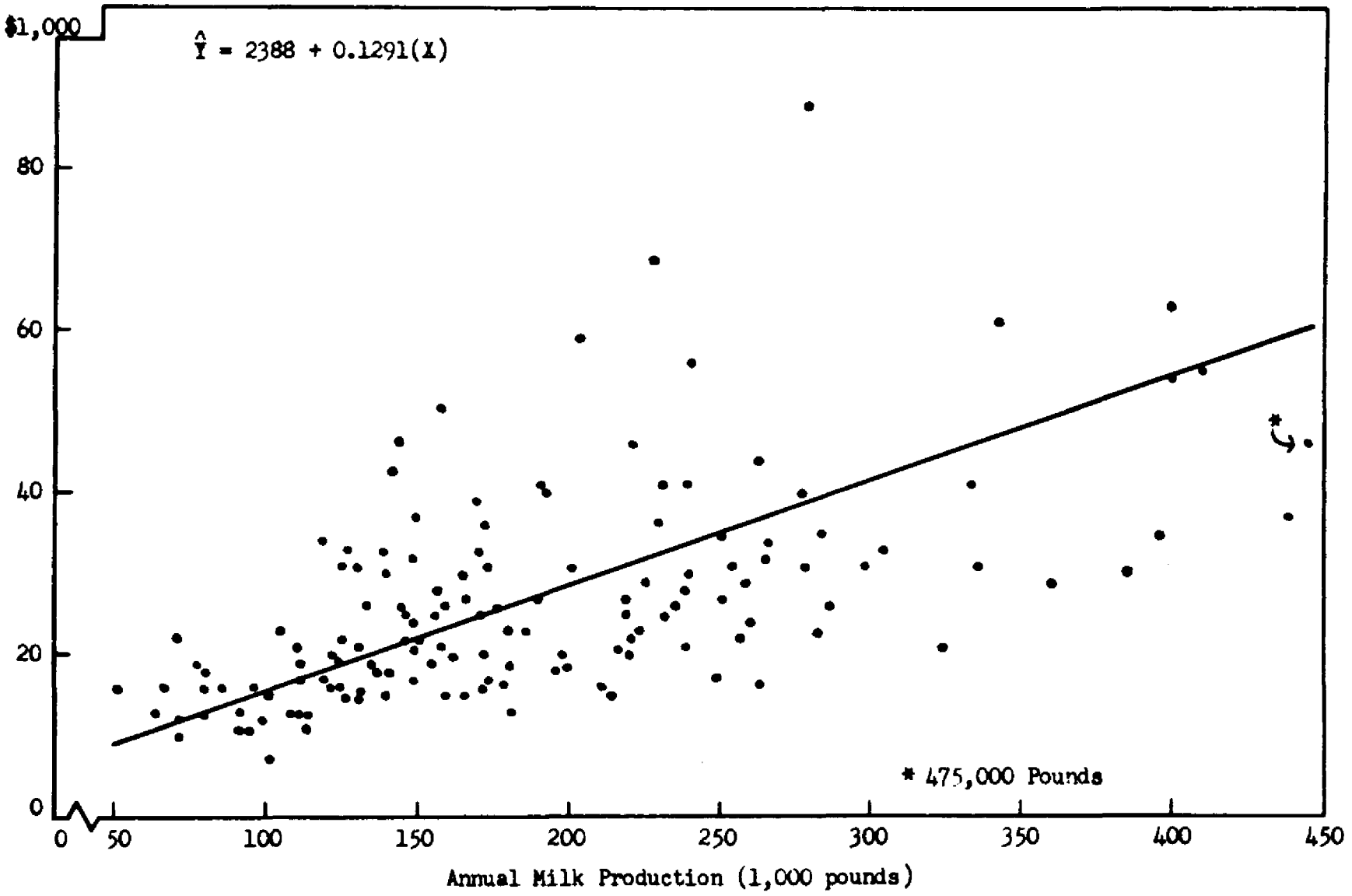
Investments

Total and average investment per 100 pounds of milk produced are shown in Table II for various sizes of production units (measured by output of milk per year). The same information is shown graphically in Figure 4. The line graph shows the increase in average investment as size of the producing unit increases.

Average total investment per farm (Table II) increased by $6,455 for each 50,000 pound increase in milk production per year. While average investment per 100 pounds of milk decreases with increased production it can be seen that it does not decrease in proportion to size of production increases. For example, when output increases from 50,000 to 100,000 pounds of milk, the average investment decreases $2.39 per 100 pounds of milk produced as compared to a decrease of only 16 cents per 100 pounds of milk produced when the production per year increases from 250,000 to 300,000 pounds.

This is in agreement with economic theory. The decrease in

Figure 4. Total Investment, 138 Dairy Farms, Louisiana, 1957.



average investment per 100 pounds of milk produced is rapid until about 200,000 pounds production per year. Average investment per 100 pounds of milk produced decreases $3.59 from a production of 50,000 pounds per

Table II - Total and Average Investment Requirements, 138 Dairy Farms, Louisiana, 1957

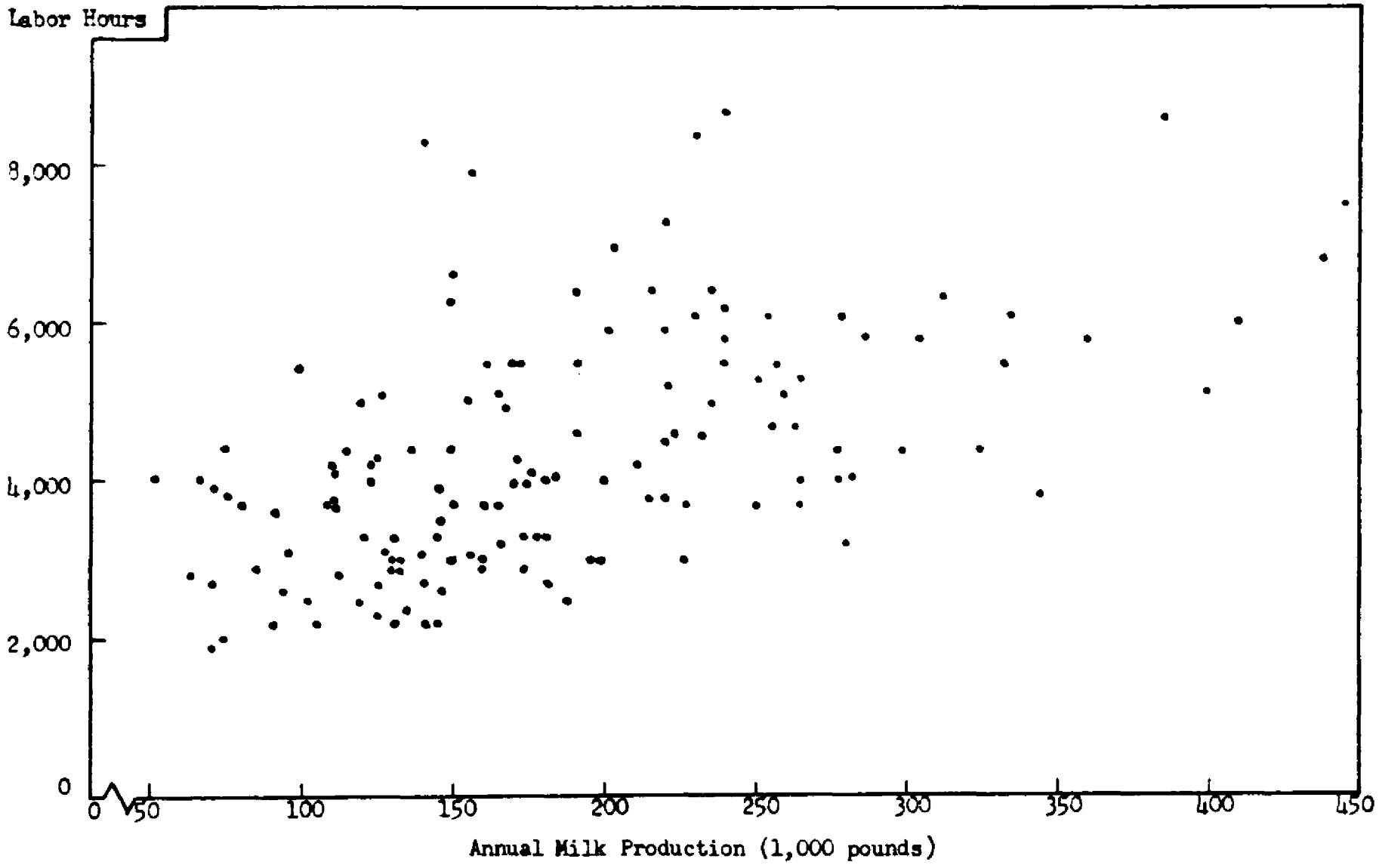
Pounds of Milk Produced Per Year (1)	Total Investment Per Farm 1/ (2)	Average Investment Per 100 Pounds of Milk (3)
50,000	$ 8,843	$17.69
100,000	15,298	15.30
150,000	21,753	14.50
200,000	28,208	14.10
250,000	34,663	13.87
300,000	41,118	13.71
350,000	47,573	13.59
400,000	54,028	13.51
450,000	60,483	13.44

year to a production of 200,000 pounds annually, as compared to a decrease of only 61 cents from 200,000 to 350,000 pounds of milk production per year (Table II).

Labor

The amount of labor necessary for the operation of the 138 farms studied varied widely. As is shown in Figure 5, some of the dairies producing 400,000 pounds of milk per year did not use any more total hours of labor than others producing 100,000 pounds per year. It can be noted

Figure 5. Labor Hours, 138 Dairy Farms, Louisiana, 1957.



that, at any level of production, the total hours of labor used varied from 3,000 to 5,000 hours in order to accomplish the same output. Possibly some of the wide differences in amount of labor used could be attributed to pipeline milkers and bulk tanks as compared to machine milkers and can coolers.[1] Differences in production per cow also undoubtedly accounted for some differences, as very little or no more labor is required in handling and milking high producing cows as compared to low producers. Even considering the above observations the data indicate that some dairymen are not utilizing their labor efficiently

Costs in Relation to Production

In order to relate costs to output the following cost concepts were used; total costs, average costs, per cent distribution of costs, and fixed and variable costs. For the major part of the analysis costs were separated into three categories. These were: (1) cash costs, (2) cash costs plus depreciation on buildings and equipment and interest on investment, and (3) total production costs (which includes number (2) above plus the value of family and operator labor)

Cash costs were only those variable and fixed costs where cash expenditures were made each year. Most dairy production records[2] are figured on a cash cost basis.

Cash costs plus depreciation on buildings and equipment and interest

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[1] Some farms used women and children, while in others only men were employed.

[2] DHIA, Dairy Herd Improvement Associations and WADAM, Weigh-a-Day-a-Month records.

on investment are the cost figures with which most dairymen in Louisiana should be concerned. After these costs have been deducted from total receipts, the remainder is income for family living. This remainder is often called "returns to labor and management."

Dairymen should plan on replacing machinery, equipment, and buildings, and capital should be put aside for this purpose. A normal amount of interest on investment should be taken into consideration by dairymen as a fair return to capital, at the rate of interest the money could be earning if invested in other enterprises. In this study equipment and machinery was depreciated at 8 per cent per year, farm buildings (excluding operator's residence) at 4 per cent per year and interest on investment was computed at 4 per cent per year.

Included in total production costs were cash expenditures, depreciation on buildings and equipment and interest on investment, as listed in the preceding paragraph, plus the unpaid family and operator's labor, valued at 50 cents per hour. Thus, in total production costs all costs that can be charged to milk production are included.[3/] Income remaining after deducting total costs from total receipts can be related to the term "excess profits of economic theory."

Total Costs

Because of a variation in costs associated with size of operation,

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[3/] The value of operator's residences were not included in the interest on investment figure nor in depreciation on buildings. No credit was given for the use of the house and other perquisite. These items probably offset one another. (However labor hours may be over estimated)

a single average cost of milk production ($5.54 per 100 pounds produced) cannot be representative of all production groups. Such a figure is representative only of the average farm that is near the average (185,313 pounds) production. Even at this point there is a wide variation among individual producers. A single average cost usually under-states total costs for most small producers and over-states them for most medium volume and large producers.

Total Cash Costs as Related to Production

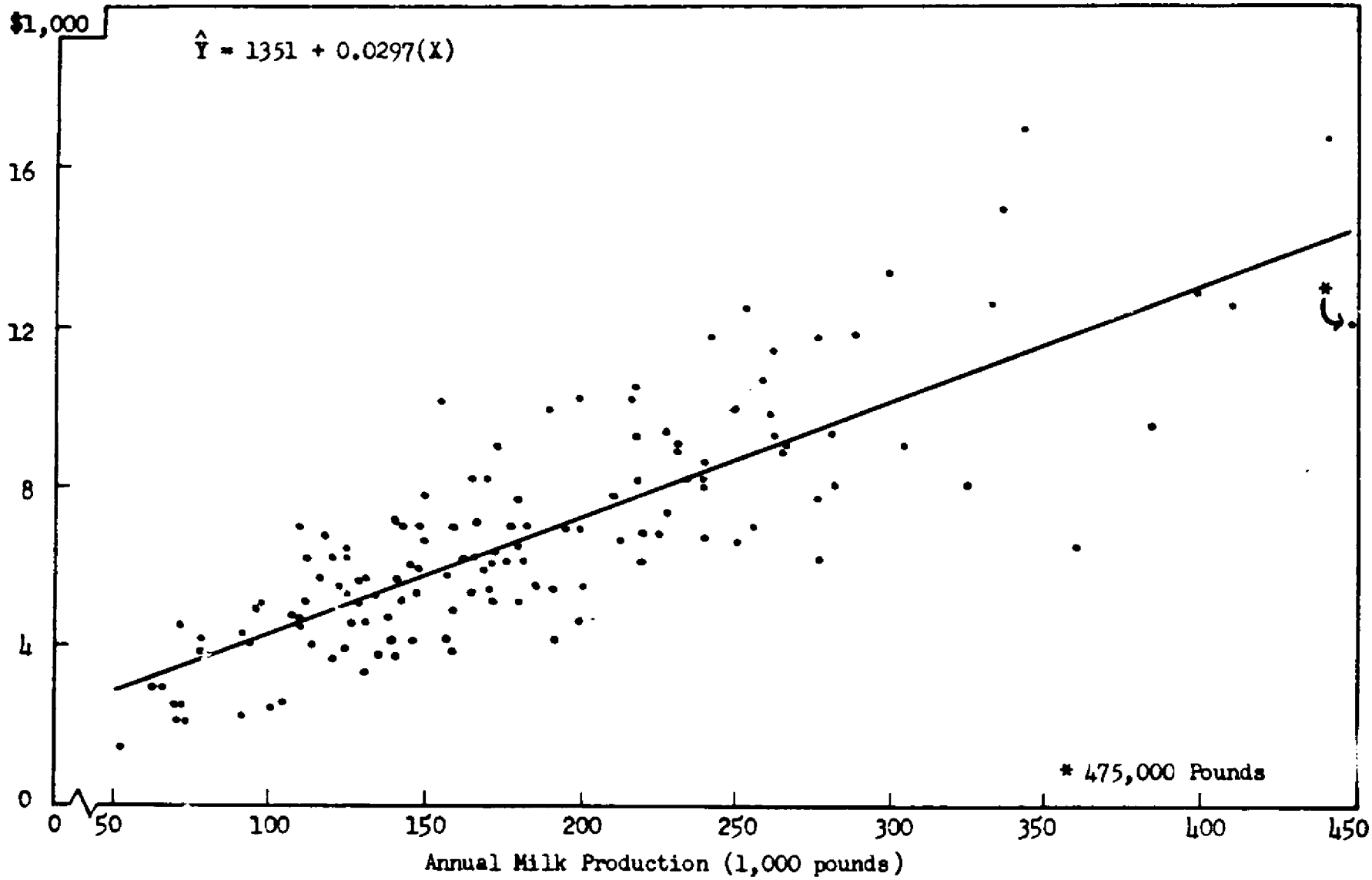
The relationship of total cash cost to annual milk production is shown in Figure 6 and Table III. Average total cash costs of milk production

Table III - Total Costs of Milk Production, 138 Dairy Farms, Louisiana, 1957

Pounds of Milk Produced per Year (1)	Total Cash Costs per Farm (2)	Total Cash Costs Plus Depreciation and Interest per Farm (3)	Total Costs per Farm 1/ (4)
50,000	$ 2,836	$ 3,700	$ 5,070
100,000	4,320	5,443	6,941
150,000	5,806	7,176	8,812
200,000	7,289	8,909	10,682
250,000	8,774	10,642	12,553
300,000	10,258	12,375	14,423
350,000	11,742	14,108	16,294
400,000	13,227	15,841	18,164
450,000	14,712	17,574	20,035

1/ Column 3 plus the value of operator and family labor.

Figure 6. Cash Expenses, 138 Dairy Farms, Louisiana, 1957.



increase as volume produced increases, as would be expected. Total cash costs of milk production increased from $2,836 at the 50,000 pound level to $8,774 at 250,000 pounds. For comparison, total cash costs increased from $8,774 for 250,000 pounds of production to $14,712 for 450,000 pounds.

Total Cash Costs plus Depreciation and Interest as Related to Production

Adding depreciation on buildings and equipment and interest on investment to cash costs results in a regression line (Figure 7) similar to that in Figure 6 but at a higher level. The same trend is noted in Table III. Average total cash costs, including depreciation and interest, increased as production increased. They did not increase, however, in proportion to the amount of increase in production.

Total Costs as Related to Production

Total costs of milk production, which includes cash costs, depreciation on buildings and equipment, interest on investment, and the value of unpaid family and operator's labor are shown in Table III for various sizes of production units (measured by output of milk per year). The same information is shown graphically in Figure 8. The line graph shows that total costs of production increase as size of the producing unit increases ($1,870 for each 50,000 pound increase in milk production).

Average Costs

In the short run it is obvious that all cash costs must be covered. In any industry, in the long run, costs of all factors of production must

Figure 7. Cash Expenses, Depreciation and Interest, 138 Dairy Farms, Louisiana, 1957.

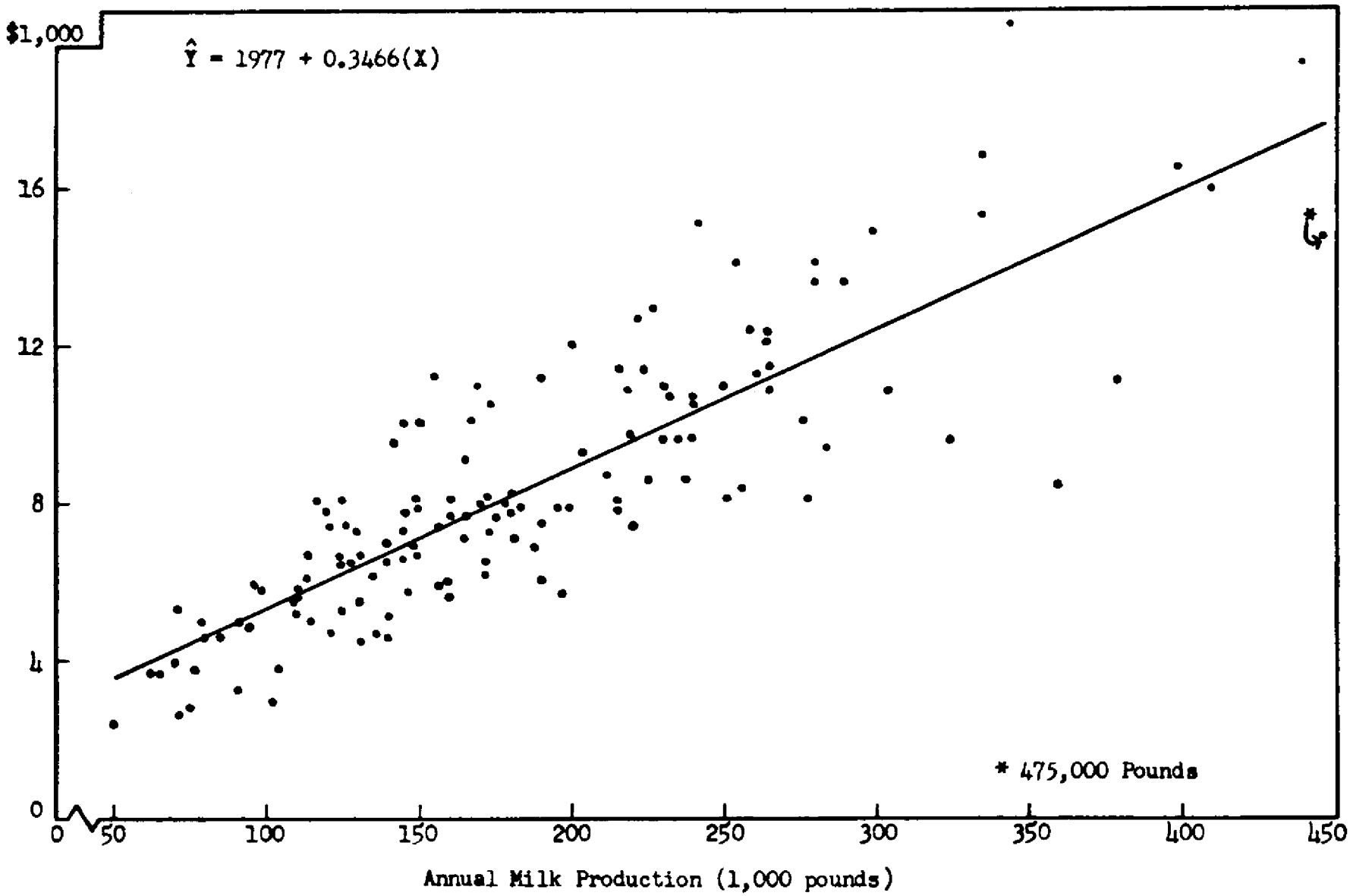
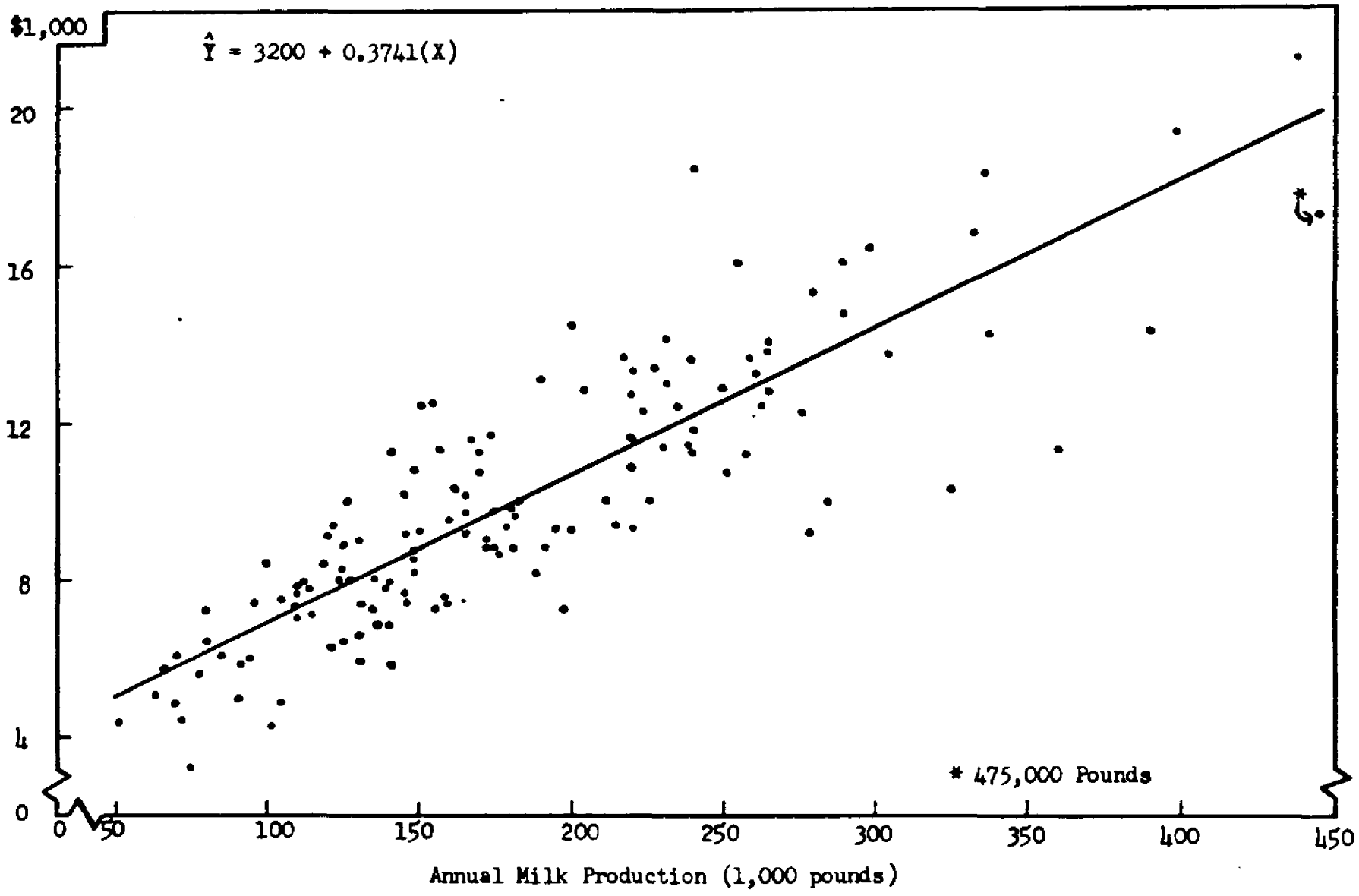


Figure 8. Total Costs (Including Cash Expenses, Depreciation, Interest and a Charge For Family Labor) 138 Dairy Farms, Louisiana, 1957.



be covered in the selling price or producers will be forced to put their factors of production into other productive channels where a fair profit for their use may be realized. As economic conditions change adjustments are often necessary and, in cases where average total costs are not being met, producers must either enlarge their business, operate more efficiently, or go out of business.

Average Cash Costs per 100 Pounds of Milk Produced

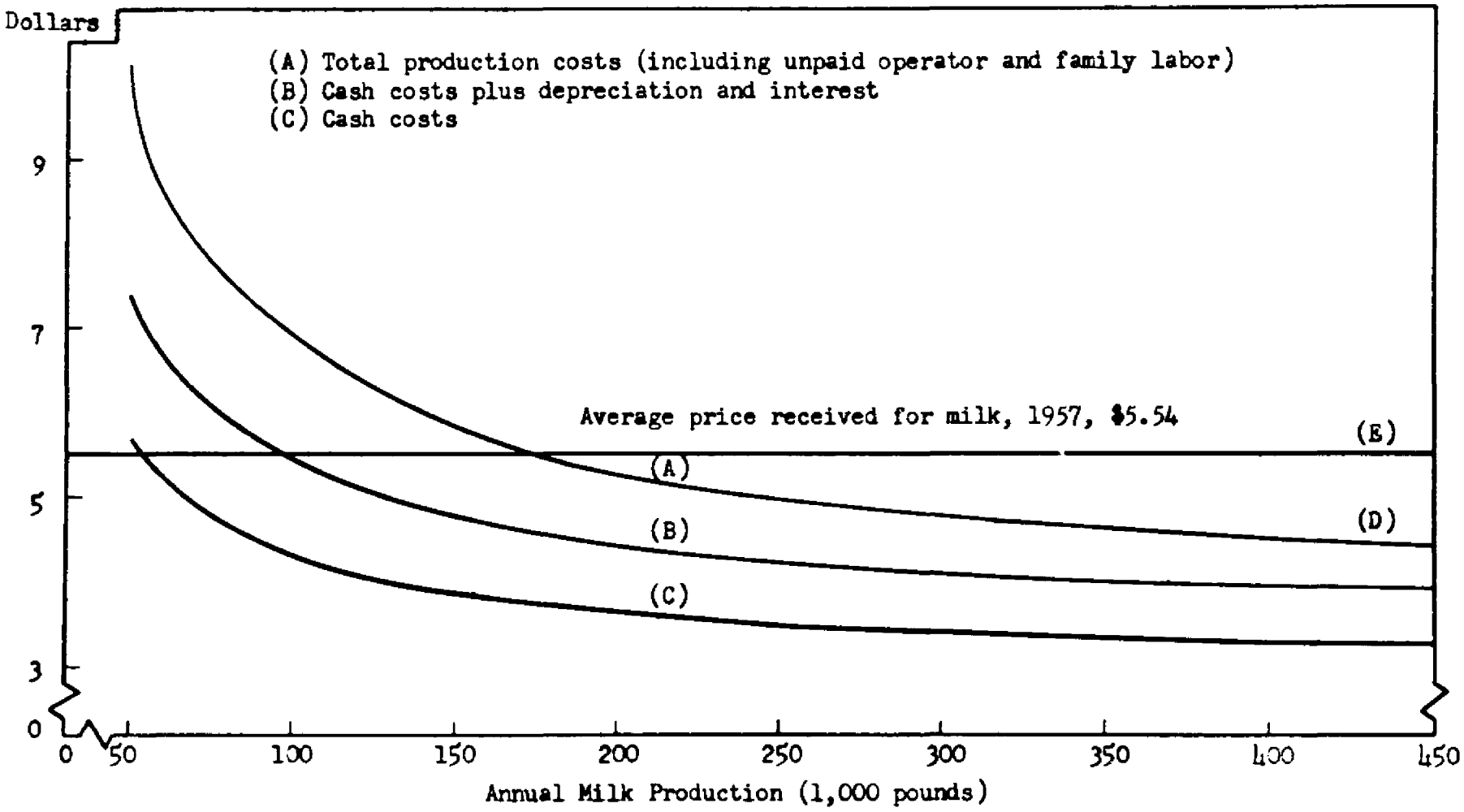
As shown in Figure 9 and Table IV, average cash costs per 100 pounds of milk produced fall fairly rapidly until the 200,000 pound production level is reached (line graph C). The average price received for milk by the 138 producers in 1957 was $5.54 per 100 pounds. Average cash costs were not covered by price until 55,000 pounds of milk were produced.

In comparing cash costs per 100 pounds of milk produced (Table IV) at different levels of production, the cash cost was $2.16 more per 100 pounds of milk produced at the 50,000 pound level than at 250,000 pounds. In contrast the difference in cash costs were only 24 cents less per 100 pounds of milk produced at the 450,000 pound level than at 250,000 pounds. Thus cash costs decrease with output, most of the decrease coming at lower levels of production.

Average Cash Costs Plus Depreciation and Interest

Many dairymen tend to think only of cash costs of operating a dairy. Because of the large amount of capital invested in equipment and dairy buildings and due to the fact that these must be replaced in order to continue operating, depreciation should be added to the cash costs. If money invested in dairies were invested in other enterprises, some

Figure 9. Average Costs Per 100 pounds of Milk Produced, and Price, 138 Dairy Farms, Louisiana, 1957.



annual return would be expected, thus a reasonable amount of interest on investment should also be included in costs as interest is the normal

Table IV - Average Costs of Milk Production (per 100 pounds), 138 Dairy Farms, Louisiana, 1957

Pounds of Milk Produced Per Year (1)	Average Cash Costs Per 100 Pounds (2)	Average Cash Costs Plus Depreciation and Interest Per 100 Pounds (3)	Average Total Costs Per 100 Pounds (4)
50,000	$5.67	$7.41	$10.14
100,000	4.32	5.44	6.94
150,000	3.87	4.78	5.87
200,000	3.64	4.45	5.34
250,000	3.51	4.26	5.02
300,000	3.42	4.13	4.81
350,000	3.35	4.03	4.66
400,000	3.31	3.96	4.54
450,000	3.27	3.91	4.45

return to capital. Producers utilizing unpaid family labor would not normally be interested in total production costs but rather the labor and management returns to the farm after cash costs, depreciation and interest were charged. This would be the money available for family living.

As noted in Figure 9, average cash costs plus depreciation and interest were not covered by price in 1957 until a minimum of 95,000 pounds of milk was produced. According to these data, a dairy farmer

would receive no labor income until over 95,000 pounds of milk were produced per year.

Average total cash costs plus depreciation and interest (Table III, Column 3) increased as production increased. They did not increase, however, in proportion to the amount of increase in production. Thus the average cost of milk production decreased rapidly from $7.41 per 100 pounds, at a level of 50,000 pounds to $4.26 at 250,000 pounds (Table IV, Column 3). Between production levels of 250,000 and 450,000 pounds, average costs per 100 pounds produced declined only 35 cents.

Average Total Production Costs

Average total production costs include the value of unpaid family and operator's labor along with cash costs, depreciation and interest. A minimum level of milk production of 178,000 pounds annually was necessary before production costs were covered (Figure 9). Theoretically the area ADE (Figure 9) would be "excess profits" as all production costs were covered.4/

Average total costs per 100 pounds of milk produced (Table IV) decreases as output increases and, in accordance with economic theory, by a declining amount for each additional 50,000 pound increase in

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4/The author recognizes that 50 cents per hour plus farm privileges may be a low labor charge for the operator's labor. Also depreciation and interest on the operator's residence was purposely not included. Had these charges been included, average costs on these 138 selected dairy farms would have been slightly higher and the equilibrium point, as far as production per year is concerned, would probably have been about 200,000 pounds. The operator's residences were left out of the computations because of the very great variation in values. These variations could not be related to the dairy as a producing firm.

production. The average total cost per 100 pounds of milk is $5.12 less when production per year is 250,000 pounds as compared to 50,000 pounds. The decrease in average total cost is only 57 cents per 100 pounds when production is increased from 250,000 pounds to 450,000 pounds.[5/]

Per Cent Distribution of Costs

In identifying the per cent distribution of costs in this study, costs were broken down into the following categories; feed, fertilizer, seed, cash labor, real estate and income taxes, insurance, interest on borrowed capital, "other" items (which includes milk hauling, supplies, breeding fees, equipment and building repairs, veterinarian supplies, gas and oil, utilities, rent, machine hire, etc.), depreciation on buildings and equipment, interest on investment, and unpaid family and operator's labor. This was done, not in an effort to set standards, but rather to establish "bench marks" so that individual dairymen's records can be compared with the averages of the dairy farms included in this study. For most cost items, the percentages of cash costs, cash costs plus depreciation and interest, and total costs showed no consistant differences or trends when related to levels of production in the breakdown of individual cost items. They are shown in Appendix Tables (B1, 2, 3). A summary or averages for all levels of production is given in Table V and Figure 10. The per cent of costs expended for cash labor did show a

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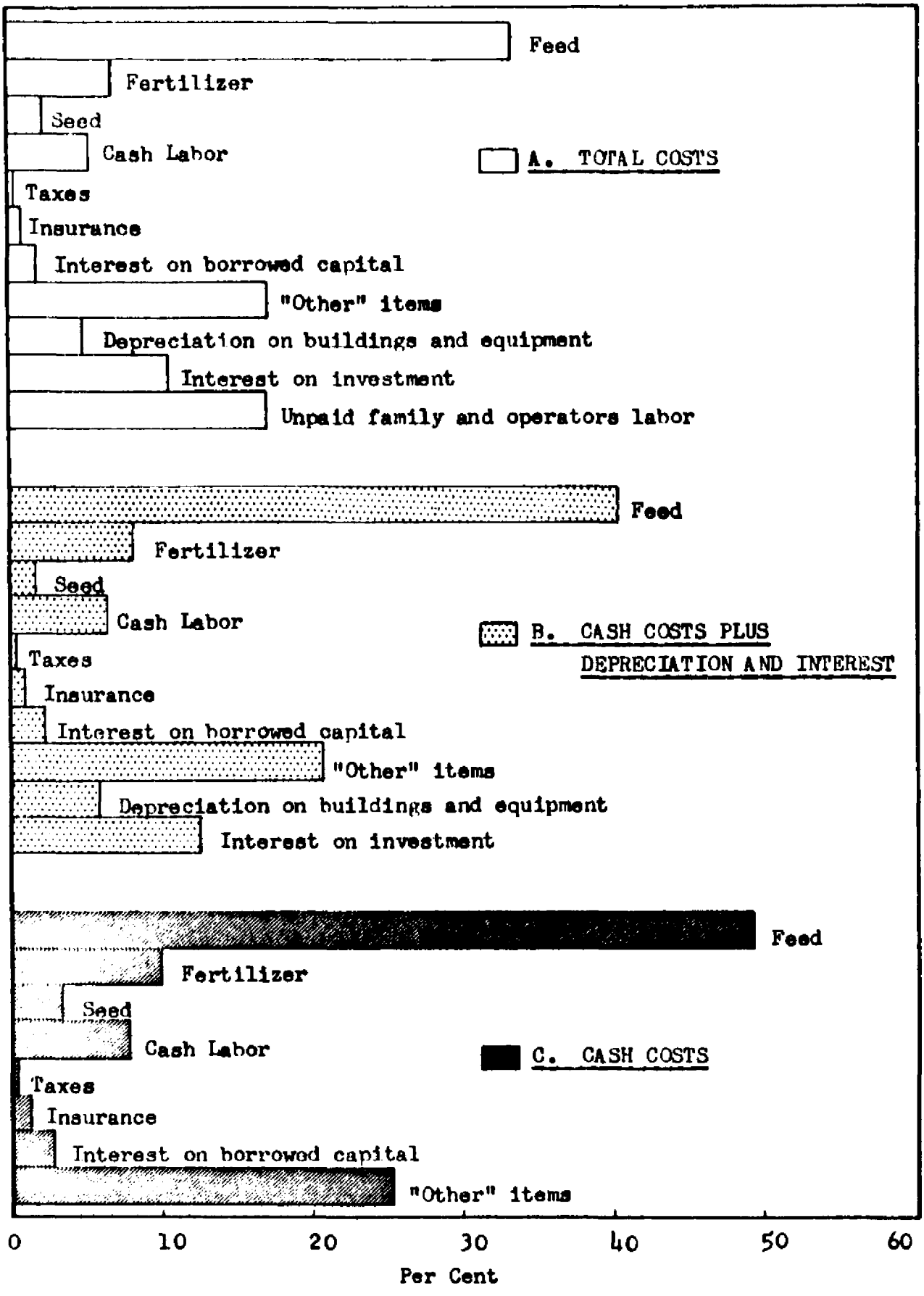
[5/] Depreciation costs and interest on investment (Table IV) play a less prominant part in costs in dairy production after production of 200,000 pounds of milk per year.

Figure 10. Per Cent Distribution of Costs in Three Categories of Cost, 138 Dairy Farms, Louisiana, 1957.



gradual increase with each 50,000 pound increase in production.[6]

Feed costs (Figure 10 and Column 1, Table V) were the largest single expense item, constituting 49.29 per cent of cash costs, 40.19 per cent of cash costs plus depreciation and interest, and 33.33 per cent of total production costs. The next largest percentage of milk production cost was "other items" which includes milk hauling, building and equipment repairs along with other miscellaneous expense, the respective percentages being 25.37, 20.68 and 17.15 (Column 8, Table V).

Fertilizer and cash labor were the next largest contributors to cash costs contributing 9.85 and 7.80 per cent, respectively. Taxes, insurance, seed, and interest on borrowed capital together only accounted for 7.69 per cent of total cash costs.

After depreciation charges on buildings and equipment and interest on investment were added to cash costs, the per cent spent on feed dropped to 40.19 per cent (Column 1, Table V) while 5.90 per cent of the costs became depreciation charges on buildings and equipment and 12.57 per cent became interest on investment.

When family labor is included as a cost, the per cent of total costs expended for feed amounted to 33.33 per cent. This decrease is due in part to 17.07 per cent of total costs (Column 11, Table V) accounted

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[6] As noted in Appendix Tables (B1, 2, 3), the per cent of labor costs did increase with each increment increase in production except for the last category (over 350,000 pounds) where it showed a sharp decrease. This may have been due to the small numbers of farms (6) that were in this category. It is also interesting to note that the per cent expended for interest on borrowed capital decreased with each 50,000 pound increase in production.

Table V - Per Cent of Costs Expended on Various Cost Items, 138 Dairy Farms, Louisiana, 1957

Classification of Costs	Feed	Fertilizer	Seed	Cash Labor	Taxes 2/	Insurance	Interest on Borrowed Capital	Other Items 3/	Depreciation on Bldg. and Equipment 4/	Interest on Investment 5/	Unpaid Family and Operator's Labor
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Cash Costs	49.29	9.85	3.37	7.80	.39	1.20	2.73	25.37	----	-----	----
Cash Costs Plus Depreciation on Buildings and Equipment and Interest on Investment	40.19	8.03	2.75	6.36	.31	.98	2.23	20.68	5.90	12.57	----
Total Costs Including Cash, Depreciation on Buildings & Equipment & Value of Unpaid Family and Operator's Labor 1/	33.33	6.66	2.28	5.27	.26	.81	1.85	17.15	4.89	10.43	17.07

1/ Unpaid family and operator's labor was valued at $0.50 per hour (no dollar value was placed on farm perquisites).

2/ Only real estate and income taxes were included.

3/ Includes milk hauling, veterinarian expense, utilities, supplies, breeding fees, etc.

4/ Buildings were depreciated at 4 per cent per year; equipment at 8 per cent per year.

5/ Figured at 4 per cent for total investment excluding operator's residence.

for by the value of unpaid family and operator's labor.7/ The value of unpaid family and operator's labor plus cash labor constitutes 32.34 per cent of the total costs of milk production for the farms included in this study. Feed, labor, "other" cash items, depreciation on buildings and equipment and interest on investment make up 93.25 per cent of the total costs of milk production when family labor is included as a cost.

Costs Related to Size of Milking Herd

Weighted averages were used in computing costs as related to size of the milking herds. That is, the various costs of all producers in a herd size group were divided by the aggregate cost item in question (for example feed cost) and reduced to costs per 100 pounds of milk produced. Distribution of farms in each herd size group was somewhat skewed (Table VI), with the larger number of producers found in the 21 to 30 and 31 to 40 cow groups.

The average investment per farm (Column 4, Table VI) increased from $17,471 average for herds having from 10 to 21 cows to a $47,886 average investment for herds having between 61 and 99 cows, with an overall average investment for the 138 farms of $26,312.

Investment per 100 pounds of milk produced (Column 5, Table VI) decreased from $18.55 as an average for the herds having 10 to 20 cows to

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7/ This may be a low per cent in some cases where no child labor was used. In these cases the operator's labor or other adult unpaid labor could have been valued at more than 50 cents per hour. For purposes of standardization a value of 50 cents per hour was used as an average figure for all unpaid labor.

Table VI - Investments and Components of Cost in Relation to Size of Milking Herd, 138 Dairy Farms, Louisiana, 1957

Number of Cows in Herd	Number of Farms	Number of Cows	Average Investment Per Farm 1/	Average Investment Per 100 Lbs. Milk Produced 1/	Cash Expense Per 100 Lbs. Milk Produced	Cash Expense Plus Depreciation and Interest Per 100 Lbs. Milk Produced 2/	Total Production Costs Per 100 Lbs. Milk Produced 3/	Variable Costs Per 100 Lbs. Milk Produced	Fixed Costs Per 100 Lbs. Milk Produced 4/
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10-20	9	165	$17,471	$18.55	$3.61	$4.72	$6.29	$3.39	$1.33
21-30	44	1153	19,233	14.28	3.79	4.63	5.80	3.58	1.05
31-40	38	1363	24,643	13.69	3.61	4.41	5.39	3.48	.92
41-50	21	958	30,082	13.68	3.74	4.56	5.35	3.57	.98
51-60	15	841	35,501	12.71	3.62	4.38	5.16	3.48	.90
61-99	11	818	47,886	17.26	3.91	4.90	5.55	3.79	1.11
Totals and Averages	138	5298	26,312	14.20	3.70	4.53	5.47	3.54	.99

1/ Excludes operator's residence.

2/ Includes depreciation on equipment (8% annually) and all buildings (4% annually) except operator residence and 4% interest on investment.

3/ Includes unpaid family and operator's labor valued at .50 per hour.

4/ Includes depreciation on buildings and equipment and interest on investment but no charge for unpaid family and operator's labor. Therefore the addition of variable and fixed costs will not equal total costs, but rather cash costs plus depreciation on buildings and equipment and interest on investment.

$12.71 for each 100 pounds of milk produced in the herds averaging 51 to 60 cows. The 61 to 99 size cow group averaged $17.26 investment per 100 pounds of milk produced, which as noted in Table VI, did not follow the trend set by the other cow size groups.[8/]

Cash expenses per 100 pounds of milk produced averaged $3.70 and varied in different size cow groups with no apparent consistency. This was also true in the cash costs plus depreciation and interest category of costs (Column 7, Table VI). The average cost of milk production in this cost category was $4.53 per 100 pounds of milk produced.

Total production costs, including the value of unpaid family and operator's labor decreased from $6.29 per 100 pounds of milk produced in the 10 to 20 cow group to $5.16 in the group having between 51 to 60 cows. In the group having 61 to 99 cows, total production costs averaged $5.55 per 100 pounds of milk produced. These data suggest that a minimum size family dairy production unit in Louisiana, based on these 138 observations, may be about 35 cows, if production per cow is about 5,000 pounds of milk per year.

Variable costs (Column 9, Table VI) showed no consistent decrease per pound of milk produced as the size of the herds increased. The average variable costs were $3.54 per 100 pounds of milk produced.

Fixed costs (Column 10, Table VI) did show a reduction per 100 pounds of milk produced, from $1.33 average in the group with 10 to 20

8/ This may have been due to the small number of herds in this classification (11). Also some of the larger herds had recently gone into the dairy business from "row crop" farming and were over invested in buildings and equipment.

cows to an average of 90 cents in the 51-60 cow group. The average fixed costs per 100 pounds of milk produced (less operator's residence) on all 138 farms was 99 cents.

Costs Related to Production Per Cow

Weighted averages were used (cost and returns of all cows in the various production groups were divided into aggregate cost and returns for each group) in computing cost and income per cow as related to average annual production per cow (Table VII).

The number of cows in each production group (Column 3, Table VII) approximated a normal distribution with the largest number (1713) in the 4001 to 5000 pounds production per cow group.

Cash expenses per cow (Column 4, Table VII) increased from $114.57 for those averaging 2000 to 3000 pounds of milk per year to $252.98 per cow in the herds averaging over 8000 pounds of milk per year. Cash expenses plus depreciation and interest increased from $145.42 to $299.30 per cow respectively (Column 5, Table VII). Total production expenses (Column 6, Table VII) likewise increased from $175.89 in the group where average production per cow was between 2000 and 3000 pounds to $357.26 per cow in the group averaging over 8000 pounds of milk per cow per year.

While expenses per cow increased with higher production per cow income per cow increased even more. Thus net income also increased as production per cow increased.

Net cash income per cow increased from $48.04 in the group averaging 2000 to 3000 pounds (Column 7, Table VII) to $257.88 per cow in

Table VII - Costs and Income Per Cow in Relation to Average Production Per Cow, 138 Dairy Farms, Louisiana, 1957 1/

Average Production Per Cow	No. Farms	No. Cows	Cash Expense Per Cow	Cash Expense Plus Depreciation and Interest, Per Cow	Total Production Expense Per Cow 2/	Net Cash Income Per Cow 3/	Income for Family Living Per Cow 4/	Net Income Per Cow 5/
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2000 to 3000 lbs.	8	420	114.57	145.42	175.89	48.04	6.39	-13.28
3001 to 4000 lbs.	29	1130	144.90	183.63	221.50	76.68	34.10	- 3.77
4001 to 5000 lbs.	45	1713	170.66	209.35	261.23	104.59	60.42	8.59
5001 to 6000 lbs.	32	1238	201.06	242.06	284.26	131.06	83.35	41.16
6001 to 7000 lbs.	10	331	237.78	289.95	338.10	140.03	90.89	42.74
7001 to 8000 lbs.	9	290	237.53	288.72	348.93	173.50	122.31	66.27
Over 8000 lbs.	5	176	252.98	299.30	357.26	257.88	184.38	153.60
Total Average	138	5298	178.51	218.81	264.16	115.39	65.29	21.94

1/ Based on income from milk alone, not gross farm income.
2/ Includes value of unpaid family and operator's labor valued at 50 cents per hour.
3/ Cash expenses only are deducted from milk receipts.
4/ Cash expenses plus 8% depreciation on farm equipment and 4% on farm buildings (excluding operator's dwelling) deducted from milk receipts.
5/ Value of unpaid family and operator's labor as well as cash expenses, depreciation on buildings and equipment are deducted from milk receipts.

the group averaging over 8000 pounds of milk per cow per year.

Income for family living per cow (where cash expenses, depreciation on buildings and equipment and interest on investment had been deducted from milk receipts) showed an increase from $6.39 per cow in the 2000 to 3000 pound group to $184.38 per cow in the group averaging over 8000 pounds of milk per cow (Column 8, Table VII).2/

Net income per cow (where all costs including family labor have been deducted, Column 9, Table VII) shows an average loss of $13.28 in those herds averaging between 2000 and 3000 pounds of milk per cow per year and a net loss of $3.77 per cow in the herds averaging between 3001 and 4000 pounds per cow. Average net income per cow then increased from $8.85 in the herds with an average of from 4001 to 5000 pounds per cow to $153.60 per cow in the group with over 8000 pounds average.

Fixed and Variable Costs

(Excluding Family & Operator's Labor)

Fixed costs are those costs that are necessary for a business to begin operation and which continue regardless of the amount of output or even if production stops entirely. Fixed costs in dairy farming (as in most agricultural pursuits) are considered to be relatively high in

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2/ Many dairy farmers consider only cash expenses and cash returns. The author thinks that depreciation and interest on investment should be included in expenses. The amount left after these deductions gives the farmers income for family living, or the "returns to labor and management." Where a farmer has no intention of selling his farm and keeps buildings and equipment in good condition through repair expenses, then cash expenses may be most meaningful.

relation to variable costs as compared with non-agricultural production. High initial investment is primarily responsible for high fixed costs. Businesses can continue to operate in the short run if all variable costs are covered by prices. In fact, if all variable costs are covered and only part of the fixed costs, a business may continue to operate rationally, losing less money or only part of the fixed costs, as compared to losing all the fixed costs if operations were stopped.

Fixed Costs

In this study fixed costs included interest on investment (4 per cent per year), depreciation on buildings (4 per cent per year), depreciation on equipment (8 per cent per year), insurance, real estate taxes, and interest on borrowed capital. As in the case of most industries, fixed costs increased as the size of operation increased (Figure 11), but not in proportion to the increase in production. As shown graphically in Figure 12 and in tabular form in Table VIII (Column 2) fixed costs dropped from $2.09 per 100 pounds of milk produced at 50,000 pounds of milk per year to $0.89 per 100 pounds produced at the 250,000 pound level. This was a difference of $1.20 per 100 pounds of milk produced. From the 250,000 pound production level to 450,000 pounds, fixed costs decreased only 14 cents per 100 pounds of milk produced. Unpaid family and operator's labor were not included in this analysis. Had unpaid family labor been included, fixed costs for each 100 pounds of milk produced would have been somewhat higher, as 17.07 per cent of total costs (Table V) are incurred as unpaid family and operator's labor.

Figure 11. Fixed, Variable and Total Cost (Excluding Unpaid Family and Operator Labor), 138 Dairy Farms, Louisiana, 1957.

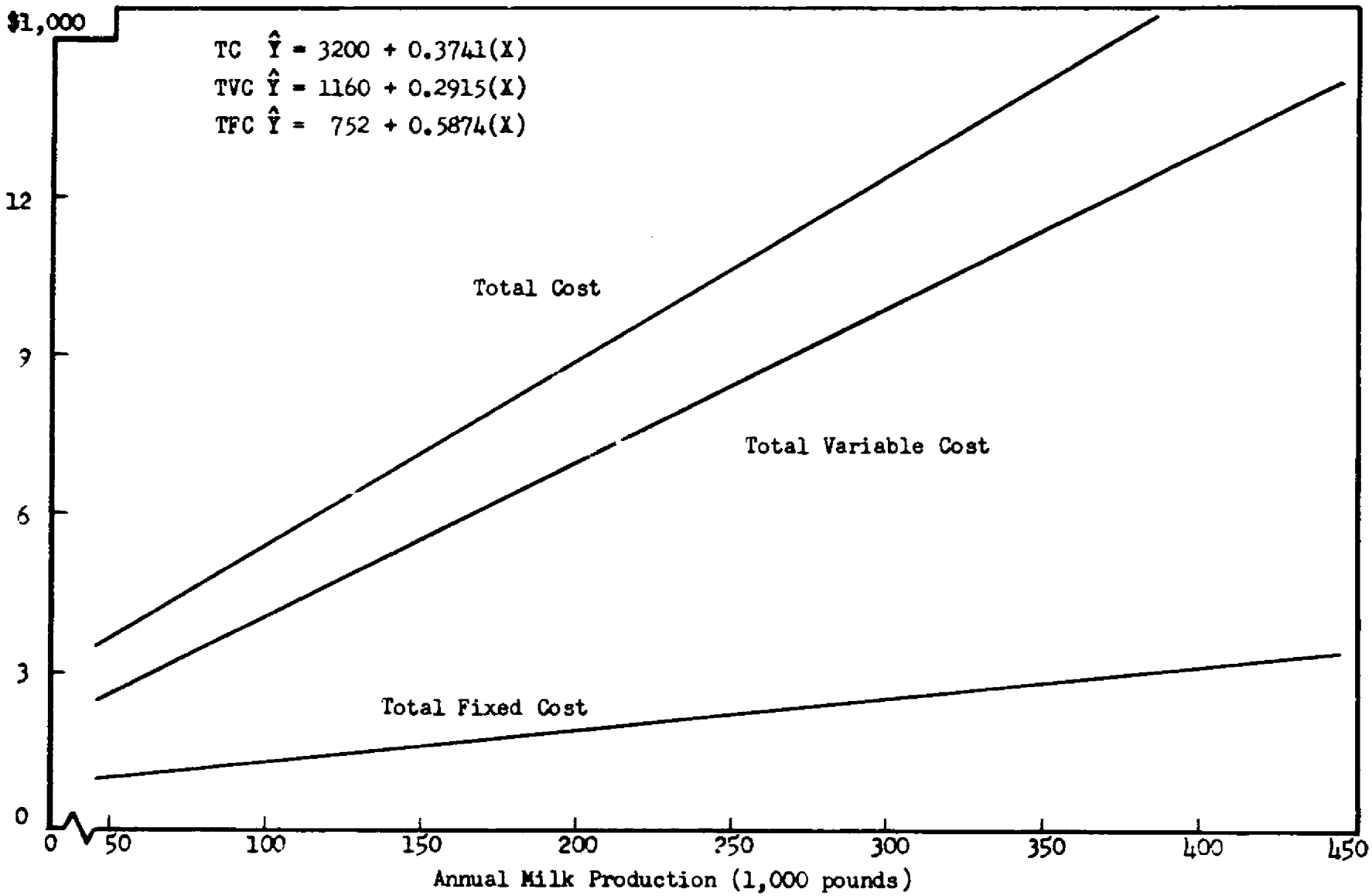
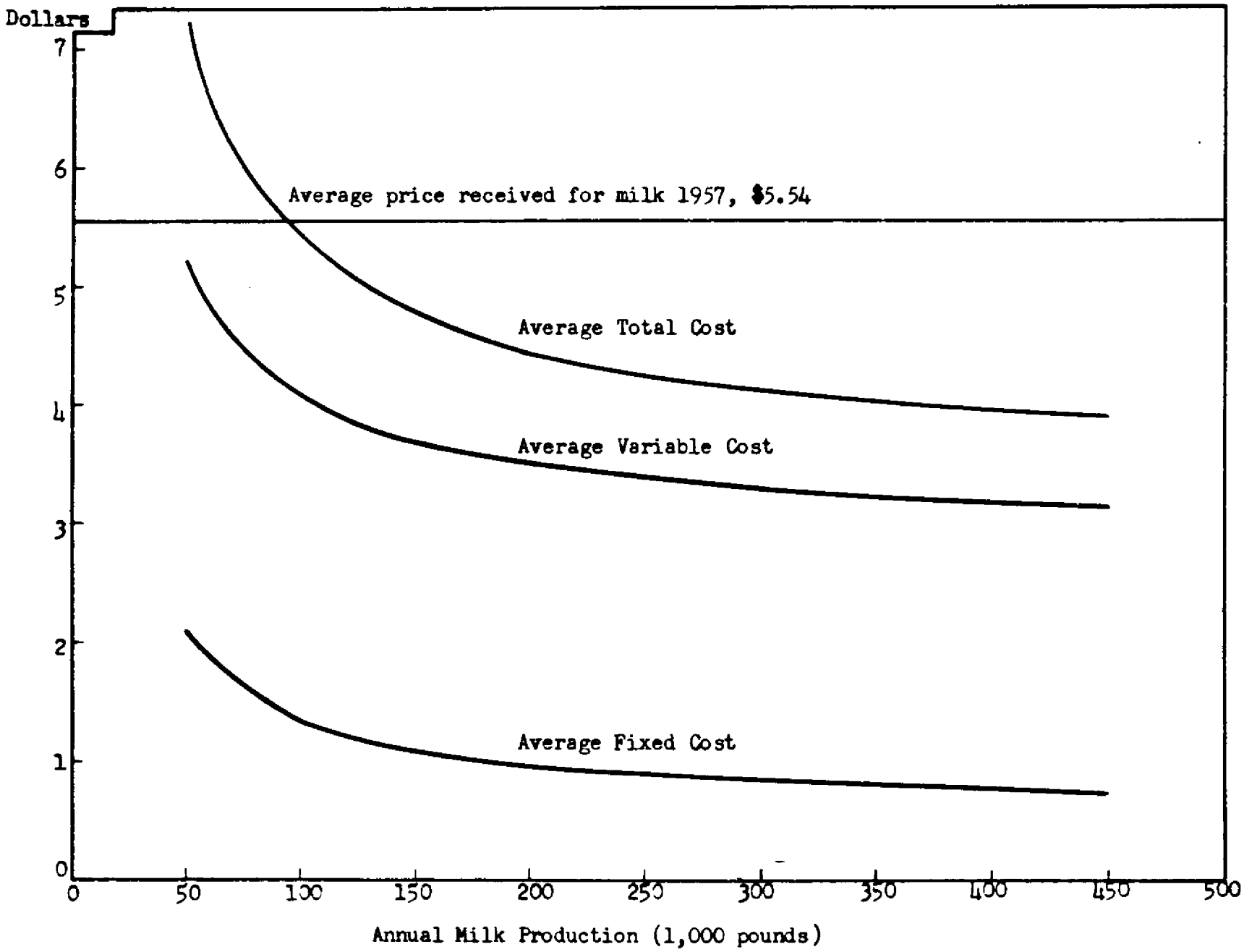


Figure 12. Average Costs Per 100 Pounds of Milk Produced (Excluding Unpaid Family and Operator Labor) 138 Dairy Farms, Louisiana, 1957.



Variable Costs

Variable costs in this study includes all cash expenditures incurred in the operation of the dairy except for real estate taxes,

Table VIII - Average Fixed, Average Variable, and Average Total Costs (Excluding Unpaid Family and Operator's Labor) Per 100 Pounds of Milk Produced, 138 Dairy Farms, Louisiana, 1957

Pounds of Milk Produced Per Year (1)	Average Fixed Costs Per 100 Pounds Milk (2)	Average Variable Costs Per 100 Pounds Milk (3)	Average Total Costs Per 100 Pounds of Milk 1/ (4)
50,000	$2.09	$5.23	$7.32
100,000	1.33	4.08	5.41
150,000	1.09	3.69	4.78
200,000	.96	3.50	4.46
250,000	.89	3.38	4.27
300,000	.84	3.30	4.14
350,000	.80	3.25	4.05
400,000	.78	3.21	3.99
450,000	.75	3.17	3.92

1/ Does not include value of unpaid family and operator's labor. Thus it differs from other total cost figures in this study. Total cost as listed above should be compared to cash costs plus depreciation and interest as labeled in other parts of the study.

insurance, and interest on borrowed capital (which are handled as fixed costs). As shown in Figure 10, feed is the largest single item of variable costs accounting for 33.33 per cent of total costs and 49.29 per cent of cash costs of milk production.

Total variable costs (Figure 11) increase as production increases and at a much more rapid rate than fixed costs. As shown graphically (Figure 12) and in Column 3 (Table VIII) average variable costs decreased by $1.85 per 100 pounds of milk as production increased from 50,000 pounds to 250,000 pounds. When production increased from 250,000 pounds to 450,000 pounds, average variable costs decreased from $3.38 per 100 pounds of milk produced to $3.17, or 20 cents for each 100 pounds produced.

Returns From the Dairy

Cash costs, cash costs plus depreciation on buildings and equipment and total production costs are shown graphically in Figure 13 as they relate to total milk sales and gross returns to the farm for various size of producing units (measured by output of milk per year).[10/] These cost and return relationships were measured by means of linear regression, (Y = A + BX). The relationship between costs and returns shown in Figure 13 are similar to the "breakeven" concept of economic theory.

Cash Costs as Related to Total Milk Sales and Gross Returns

The cash cost line (Figure 13) is lower than the milk sales at any level of production greater than 40,000 pounds annually. Cash expenses of milk production on the 138 dairy farms were lower than the gross returns, if 20,000 pounds of milk or more were being produced annually. It is true that the cost of all factors of production must be

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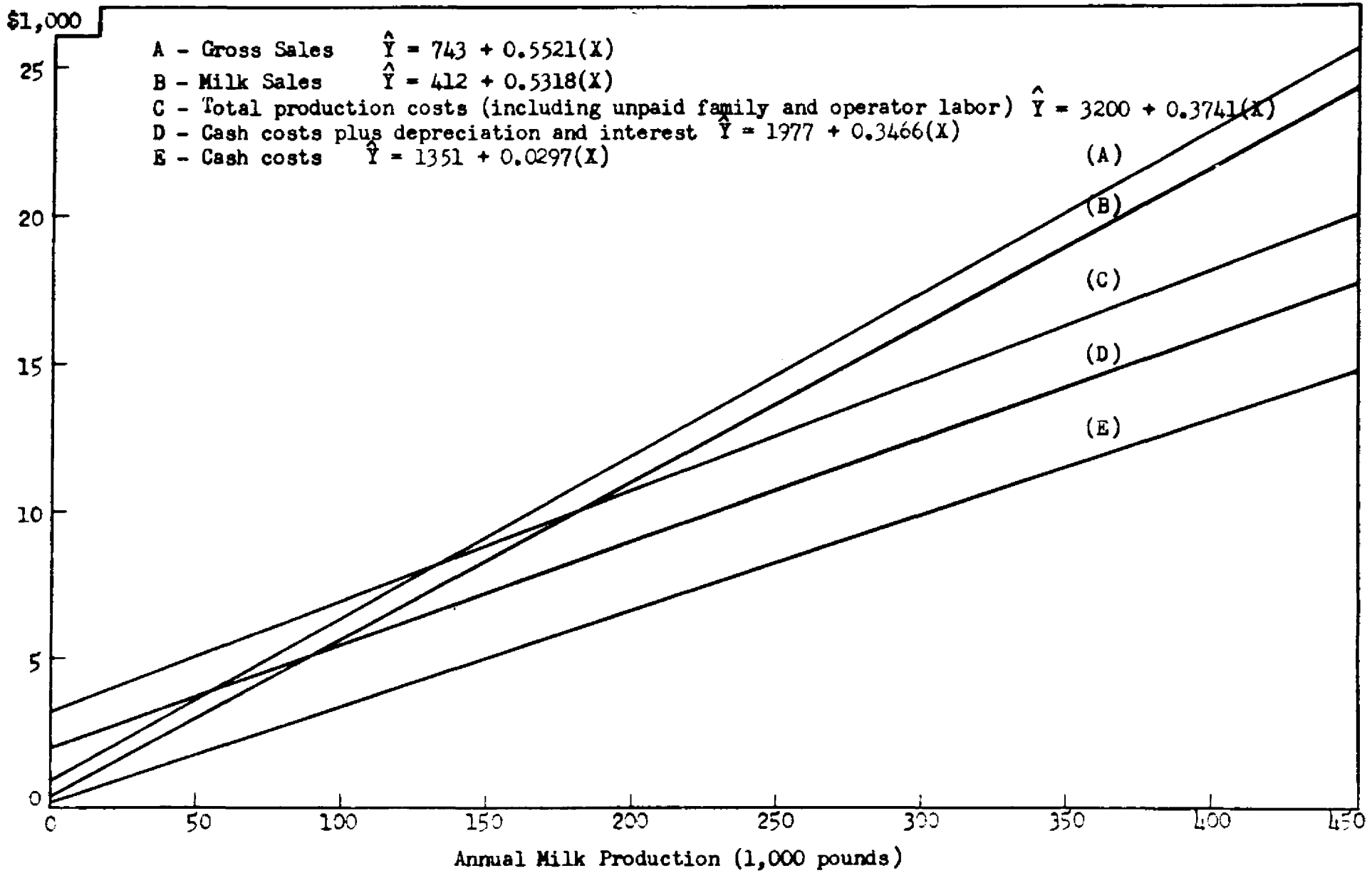
[10/] The differences in "milk sales" and "gross returns" are accounted for by value of animals sold, returns for use of equipment off the farm, and Government payments.

Figure 13. Total Costs and Returns, 138 Dairy Farms, Louisiana, 1957.



covered in the long run by the selling price or the individual producer would be better off using his resources elsewhere. However for producers already owning their farms and utilizing mostly unpaid family labor, cash costs may be the only costs considered in making production decisions.

Cash Costs Plus Depreciation and Interest as Related to Total Milk Sales and Gross Returns

After adding depreciation on buildings and equipment and interest on investment to cash costs (Figure 13), the new cost line (D) intersects the milk sales line at 95,000 pounds of milk production per year. This is in agreement with the average cost curves as shown in Figure 9. This shows that until a minimum of 95,000 pounds of milk was produced per year, cash costs plus depreciation on buildings and equipment and interest on investment were more than the income received for the milk. This same line (D) crosses the gross returns line at 57,000 pounds of milk production per year indicating that gross returns were above this category of costs at a lower level of production.

Total Costs as Related to Total Milk Sales and Gross Returns

With each additional 50,000 pounds of milk produced, average total milk sales increased $2,659 and average gross returns to the farm increased $2,761 (Column 2 and 3, Table IX). Gross returns included receipts for milk, animals, government payments and returns for use of farm and dairy equipment off the farm.

Total production costs (Figure 13) intersects the total milk sales line at about 175,000 pounds of milk production per year. (This is in agreement with average total costs in Figure 9). This indicates that,

based on the 138 farms in this study, the minimum amount of milk that must be produced per year in order to cover total costs of production

Table IX - Total Milk Sales and Gross Returns, 138 Dairy Farms, Louisiana, 1957

Pounds of Milk Produced Per Year (1)	Average Total Milk Sales 1/ (2)	Average Gross Returns to Farm 2/ (3)
50,000	$ 3,071	$ 3,504
100,000	5,730	6,264
150,000	8,389	9,025
200,000	11,048	11,785
250,000	13,707	14,545
300,000	16,366	17,306
350,000	19,025	20,067
400,000	21,684	22,827
450,000	24,343	25,588

1/ Milk sales only.

2/ Includes animals sold, returns from use of farm and dairy equipment off the farm, and Government payments as well as milk sales.

(including a charge for family and operator's labor) is 175,000 pounds.

Comparing total costs to gross returns (Figure 13) shows that (Line A) becomes greater than total production costs (Line E) at about 135,000 pounds of milk production per year. Thus, in considering gross returns, 135,000 pounds of milk must be produced before all production costs are covered by price received. The latter figure is probably most realistic since most farms do have some income from sources other than

milk alone.

Values of the coefficients of regression ("a" and "b") can be found in Appendix C.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Summary

Average total cost of producing milk in 1957 on the 138 Louisiana dairy farms included in this study was approximately $5.47 per 100 pounds produced. This compares to $5.54, the average price received. This showed average "excess profit" of 7 cents per 100 pounds of milk produced, as all relevant costs of production were included. In total costs, unpaid family and operator's labor was valued at 50 cents per hour plus farm privileges. While on specialized dairy farms, farm privileges may be of economic value, the family labor charge of 50 cents per hour may have been too low. The operator's residence was not included in this study. Had it been included, the investment per farm would not have been materially increased but average costs and returns would probably have shown the industry to be in equilibrium; i.e. total costs equaling total returns.

Investment per farm (excluding operator's residence) averaged $26,311.49 or $685.35 per cow. At the 200,000 pounds of milk production level total investment (as determined by regression analysis) was $28,208. At the annual production level of 450,000 pounds, total investment was $60,483. Average investment per 100 pounds of milk declined rapidly from $17.69 at the 50,000 pound level to $13.87 at the 250,000 pound level and $13.44 at 450,000 pounds per year. After the 250,000 pound level average investment per 100 pounds of milk produced was reduced only slightly with each increment of production. These data indicate that investment per 100 pounds of milk produced is prohibitively high when less than 200,000

pounds of milk per year are produced.

According to the data in this study, labor used on dairy farms in Louisiana varied greatly at any given level of production. For example, labor used at production levels of 60,000 and 150,000 pounds varied from approximately 2,000 to over 8,000 hours at both levels. Part of the difference may be due to use of pipeline milkers and bulk tanks, as well as other labor-saving equipment on some farms. Undoubtedly a considerable amount of labor inefficiency is also present. Production per cow plays an important role. It is well known that high-producing cows require very little, if any, more labor than low-producing ones.

In considering costs of milk production many dairy farmers in Louisiana are concerned only with cash costs as incurred each year. In the farms in this study, cash costs of milk production decreased from $5.67 per 100 pounds of milk produced at the 50,000 pound level per year to $3.64 per 100 pounds at the 200,000 pound production level. After 200,000 pounds of milk had been produced cash costs per 100 pounds decreased only slightly per 100 pounds of production.

After adding depreciation charges on buildings and equipment and interest on investment to cash costs, the data (as with cash costs only) indicate that minimum production per farm in order for the producer to realize a fair labor income, should be about 95,000 pounds of milk per year.

Where the value of unpaid family and operator's labor are added to the costs above, a minimum of 175,000 pounds of milk per year must be produced before total milk receipts will equal total costs. Also in this

study, had the value of operator's residence been included in total investment and had the operator's labor been valued at more than $.50 per hour plus farm privileges, total costs would have been somewhat higher and a minimum just over 200,000 pounds of milk per year would have been necessary to meet total costs of milk production. This figure would be lower however (about 135,000 pounds of milk) where gross returns to the whole farm are considered.

Data in this study shows that purchased feed constitutes the largest item in either cash costs (49.29 per cent), cash costs plus depreciation and interest (40.19 per cent), and total costs (33.33 per cent). This is in agreement with other "cost of milk production" studies. Probably more progress can be made by dairymen in lowering costs of milk production by reducing costs of purchased feed than by any other single item. The next largest cash cost item was "other costs" (25.37 per cent of cash costs). This category included milk hauling, breeding fees, supplies, utilities, veterinarian expenses, and other miscellaneous expenses. Many of these items are incurred in direct relation to amount of milk produced and cannot be reduced any appreciable amount. However it is likely that some savings may be realized on individual farms by improved management, for example, in more efficient disease control.

In the cost category including cash costs plus depreciation on buildings and equipment and interest on investment, a total of 18.47 per cent of costs were incurred from depreciation and interest on investment. This constitutes a relatively high per cent of costs of production. Because equipment and housing must be replaced and invested capital could

be earning a normal rate of interest if invested in other types of production, dairy farmers should take this into consideration as well as cash costs. Value of unpaid labor accounted for 17.07 per cent of total costs as compared to 5.27 per cent for cash labor. This indicates that cash labor was a minor expense on the farms included in this study and that most were family-operated enterprises.

In relating production and costs to size of milking herds, the data show that in herds where the average number of cows ranged from 10 to 20 and 21 to 30, total costs of milk production were $6.29 and $5.80 per 100 pounds of milk produced respectively, as compared to a price of $5.54 per 100 pounds received for the milk. This indicates that a profitable dairy unit must have about 35 cows in order to produce milk profitably (excluding returns from anything other than milk alone).

As has been shown in numerous other studies, while costs of milk production increased with average production per cow net income per cow also increased. According to data on these 138 farms, a net loss per cow was incurred in those herds where average production was less than 4,000 pounds per year. Net income per cow then increased, as production per cow increased, from $8.58 in herds averaging between 4,001 - 5,000 pounds per cow per year to $153.60 in herds averaging over 8,000 pounds per cow per year. In herds where average production per cow was between 2,000 and 3,000 pounds per year, the net loss per cow averaged $13.28. In herds where average production per cow was between 3,001 and 4,000 pounds of milk per year, average net loss per cow was $3.77.

It would appear from these data that between 4,000 and 5,000

pounds of milk per cow per year is the equilibrium point, where average costs would equal average returns. This would vary in individual herds. This level of production establishes a basis for culling unprofitable animals in a herd.

Average total costs per 100 pounds of milk produced declined rapidly as milk production increased until about 200,000 pounds per year were produced. After this level of production, costs decreased only slightly with each additional 50,000 pounds of production. From these data we can conclude that a minimum of about 200,000 pounds of milk production per year is necessary in order to derive the major cost benefits of scale in production.

Results from the analysis of the costs and returns of the 138 farms included in this study show that a minimum of 178,000 pounds of milk must be produced per year before returns from the sale of milk (alone) will equal total costs, whereas only 135,000 pounds must be produced in order for gross returns to the dairy to equal total production costs.

Conclusions

An hypothesis proposed (Chapter III, Statement of Problem), states that investments and costs of milk production per 100 pounds of milk produced on Louisiana dairy farms decreases as the size of the dairy enterprise increases. The data from the 138 Louisiana dairy farms included in this study show that this is true. Average investment per 100 pounds of milk produced decreased from $17.69, when 50,000 pounds were produced per year, to $13.87 when 250,000 pounds of milk were produced per year. This further decreased to $13.44 per 100 pounds of milk produced in herds where 450,000 pounds of milk were produced annually.

Costs of milk production likewise decreased, as the size of the dairy enterprise increased (as measured by total pounds of milk produced annually). Cash costs decreased from $5.67 per 100 pounds of milk produced when farms produced 50,000 pounds per year to $3.51 per 100 pounds in herds producing 250,000 pounds annually to $3.27 per 100 pounds when herds produced 450,000 pounds of milk per year. Cash costs plus depreciation on buildings and equipment and interest on investment were $7.41, $4.26, and $3.91 respectively, at the specified production levels.

Average total production costs (including unpaid family labor) were $10.14, $6.94, and $5.87, per 100 pounds at the 50,000, 100,000, and 150,000 pound levels of production. Total production costs at these levels of production were more than the average price received for milk by the farms included in the study ($5.54 per 100 pounds). At higher levels of production average total costs of production decreased even

further. At 250,000 pounds total costs were $5.02 per 100 pounds as compared to $4.45 where total production was 450,000 pounds annually.

The second hypothesis was, "average production per cow for an efficient, economic size dairy unit in Louisiana must average a minimum of 6,000 pounds of milk annually." According to the data in the 138 selected herds studied, the average "break even" point was between 4,001 and 5,000 pounds of milk per cow per year. In herds where average production per cow was from 2,000 to 3,000 pounds per year, a net loss of $13.28 per cow was incurred and the average loss per cow was $3.77 in herds where the average production was between 3,001 and 4,000 pounds of milk per year.

The average production per cow for all 5,298 cows included in the study was 4,827 pounds per year. Average price received for all milk was $5.54 per 100 pounds as compared to total average production costs of $5.47. It appears that an average of approximately 4,800 pounds of milk per cow per year is necessary in order to cover all production costs (including family labor).

"A forty-cow herd represents an economic family size dairy enterprise in Louisiana," the third proposed hypothesis appears, according to the data in this study, to be approximately correct. In the 38 herds having between 31 and 40 cows, average total production costs were $5.39 for each 100 pounds of milk produced. Smaller herds (21 to 30 cows) had an average total production cost of $5.80, as compared to the average selling price of $5.54 for each 100 pounds of milk.

The fourth hypothesis was "a minimum of 200,000 pounds of milk

annually must be produced for each family-size dairy unit for efficient economic production."

According to the cost and returns analysis in this study, 178,000 pounds of milk is the volume per year necessary in order that total production costs will be covered by total milk sales. Only 135,000 pounds of annual milk production per farm was necessary for gross returns to the dairy to equal total costs.

This study shows that cash costs plus depreciation and interest on investment averaged $8,909 for the production of 200,000 pounds of milk in 1957 as compared to $11,048 received from the sale of the milk. There remains a labor income from milk sales alone (money left for family living) of $2,140 per year. From average gross returns per farm, (milk plus other sales) the labor income or money available for family living averaged $2,877 at the 200,000 pound level of production. When a charge is made for family and operator's labor as well as cash costs, depreciation, and interest, net returns at the 200,000 pound level of production is $1,103. If only cash costs of production are considered, net cash returns over costs are $4,496 at this production level.

Considering present day living costs, it can be concluded that a minimum of 200,000 pounds of milk production per year must be produced for each family size dairy unit to be an efficient unit so that gross returns will meet the costs of production and leave enough money for family living.

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A P P E N D I X

Appendix A - Schedule Used for Collecting Information for Cost of Milk Production Study

Number _____ Name _____

Address _____

QUESTIONNAIRE

Table I

Item	Number	Beginning Value	Number	Ending Value	Depreciation Rate	Depreciation Amount
Land — Including fencing						
Alluvial (Acres)						
Hill (Acres)						
Prairie (Acres)						
Buildings[1]						
Tenate House						
Milking Barn						
Loafing Hay Barns						
Other:						
Silos:						
Trench						
Upright						
Box						
Other:						
Equipment:						
Farm						
Tractor						
Truck						
Disc						
Mowing Machine						
Fertilizer Distributor						
Silage Harvester						
Wagon						
Cart						
Trailor						
Manure Spreader						
Rake						
Baler						
Other:						

Dairy:						
Bulk Tank						
Other Cooler						
Pipeline Milking Equip.						
Other Milking Equip.						
Milking Machine						
Hot Water Tank						
Sink						
Other:						
Livestock:						
Cows Producing & Dry						
Bulls						
Young Dairy Stock(over 1 yr.)						
Calves (under 1 year)						
Totals						
Depreciation						
Computation of interest						

[1]Operators dwellings not included in study

RECEIPTS (GROSS) 12 MONTHS

Table II

Item	Amount	Value
Cash:		
Milk		
Culls		
Calves		
Government Payment		
Other:		
Total		

EXPENSES (NOT INCLUDING UNPAID FAMILY LABOR) 12 MONTHS

Table III

Item	Amount	Value
Variable:		
Concentrates Purchased		
Forage		
Fertilizer		
Seed		
Milk Hauling		
Cash Labor[1]		
Supplies		
Breeding Fees		
Repairs		
Building		
Equipment		
Veterinarian		
Gas and Oil		
Electricity		
Rent on Land		
Machine Hire		
Miscellaneous		
Total		
Fixed:		
Insurance		
Taxes		
Interest		
[illegible]		
Other:		
Total		

[illegible]

LABOR (HOURS)

Table IV

Item	Number	Hours Per Day	Number Days	Value
Operator				
Unpaid Family				
Hired:				
Year Round				
Seasonal				
Total				

SUMMARY

Table V

Item	Value
1. Receipts (Table II)	
2. Increase in Inventory (Table I)	
3. Total Income	
4. Expenses (Table III)	
5. Labor (Hired) (Table IV)	
6. Total Cash Expense	
7. Unpaid Family Labor (Table IV)	
8. Decrease in Inventory (Table I)	
9. Total Expenses	
10. Farm Income (Line 9-3)	
11. Interest on Farm Capital (5%)	
12. Labor Income (Line 10-11)	

LABOR INPUTS

(Milking phase of operation includes getting cows up, preparing for milking, milking, and cleaning up)

Table VI

	A.M. Milking		P.M. Milking	
	Number	Total Hours	Number	Total Hours
Item				
Men				
Women				
Children				
Total				

Appendix Table B1 - Per Cent of Cash Cost Expended on Various Cost Items, 138 Dairy Farms, Louisiana, 1957

Pounds of Milk Produced Annually	No. Farms	Per Cent Spent for Feed	Per Cent Spent for Fertilizer	Per Cent Spent for Seed	Per Cent Spent for Cash Labor	Per Cent Spent for Taxes 1/	Per Cent Spent for Insurance	Per Cent Spent for Interest on Borrowed Capital	Per Cent Spent for Other Items 2/
50,000 to 100,000	16	46.82	9.53	3.64	4.54	.0	1.23	5.18	29.06
100,001 to 150,000	40	48.75	10.27	3.55	6.82	.34	1.58	3.07	25.62
150,001 to 200,000	32	51.05	9.37	2.96	5.92	.36	1.12	3.00	26.22
200,001 to 250,000	23	51.17	9.62	2.82	8.95	.49	1.13	3.18	22.64
250,001 to 300,000	16	47.08	9.04	3.19	9.67	.43	1.08	1.88	27.63
300,001 to 350,000	5	46.62	9.31	4.35	14.27	.34	1.04	.88	23.19
Over 350,000	6	49.39	13.08	4.91	5.94	.57	.97	1.25	23.89
Total Average	138	49.29	9.85	3.37	7.80	.39	1.20	2.73	25.37

1/ Real estate and Income Taxes only

2/ Includes milk hauling, veterinarian, supplies, utilities, etc.

Appendix Table B2 - Per Cent of Cash Costs Plus Depreciation on Buildings and Equipment on Various Cost Items, 138 Dairy Farms, Louisiana, 1957 1/

Pounds of Milk Produced Annually	No. Farms	Per Cent Spent on Feed	Per Cent Spent on Fertilizer	Per Cent Spent for Seed	Per Cent Spent for Cash Labor	Per Cent Spent for Taxes 2/	Per Cent Spent for Insurance	Per Cent Spent on Interest on Borrowed Capital	Per Cent Spent on Other Items 3/	Per Cent Spent on Depreciation of Bldg. & Equipment	Per Cent on Interest on Investment
50,000 to 100,000	16	37.42	7.62	2.91	3.63	.0	.99	4.14	23.22	6.25	13.82
100,001 to 150,000	40	38.86	8.19	2.83	5.43	.27	1.26	2.45	20.43	6.36	13.91
150,001 to 200,000	32	41.93	7.70	2.43	4.86	.30	.92	2.46	21.54	5.28	12.58
200,001 to 250,000	23	41.89	7.88	2.31	7.33	.40	.92	2.61	18.53	5.96	12.18
250,001 to 300,000	16	38.61	7.41	2.62	7.93	.35	.88	1.54	22.66	6.09	11.90
300,001 to 350,000	5	39.54	7.89	3.69	12.10	.29	.88	.75	19.67	5.07	10.13
Over 350,000	6	40.34	10.68	4.01	4.85	.46	.80	1.02	19.52	6.20	12.13
Total Average	138	40.19	8.03	2.75	6.36	.31	.98	2.23	20.68	5.90	12.57

1/ Buildings were depreciated on a 25 year basis (4% per year) and equipment on a 12 year basis.

2/ Includes only real estate and income taxes.

3/ Includes milk hauling, veterinarian expense, supplies, utilities, etc.

Appendix Table B3 - Per Cent of Total Costs of Various Cost Items, 138 Dairy Farms, Louisiana, 1957 1/

Pounds of Milk Produced Annually	No. Farms	Per Cent on Feed	Per Cent on Fertilizer	Per Cent on Seed	Per Cent on Paid Labor	Per Cent on Taxes 2/	Per Cent on Insurance	Per Cent on Interest on Borrowed Capital	Per Cent on Other Items 3/	Per Cent on Depreciation of Bldg. and Equipment	Per Cent on Interest on Investment	Per Cent on Unpaid Family and Operator's Labor
50,000 to 100,000	16	27.44	5.58	2.14	2.66	.0	.72	3.03	17.02	4.59	10.13	26.69
100,001 to 150,000	40	31.58	6.65	2.30	4.41	.22	1.02	1.99	16.61	5.17	11.31	18.75
150,001 to 200,000	32	34.25	6.29	1.99	3.97	.24	.75	2.01	17.59	4.31	10.28	18.33
200,001 to 250,000	23	35.18	6.61	1.94	6.16	.33	.77	2.19	15.56	5.19	10.23	16.02
250,001 to 300,000	16	33.68	6.47	2.28	6.92	.30	.77	1.35	19.77	5.32	10.38	12.75
300,001 to 350,000	5	35.33	7.05	3.30	10.81	.26	.79	.67	17.58	4.53	9.05	10.64
Over 350,000	6	33.91	8.98	3.37	4.08	.39	.67	.86	16.41	5.21	10.49	15.94
Total Average	138	33.33	6.66	2.28	5.27	.26	.81	1.85	17.15	4.89	10.43	17.06

1/ Includes value on unpaid family and operator's labor. This labor was valued at $0.50 per hour.

2/ Only real estate and income taxes.

3/ Includes milk hauling, veterinarian expense, supplies, utilities, etc.

Appendix Table C - Summary of Coefficient of Regression of Various Items on Annual Milk Production, 138 Dairy Farms, Louisiana, 1957

Regression	"a"	"b"
Investment (Table II)	2388	0.1291**
Cash Costs (Table III)	1351	0.0297**
Cash Costs Plus Depreciation and Interest (Table III)	1977	0.3466**
Total Costs (Table III)	3200	0.3741**
Variable Costs (Table VIII)	1160	0.2915**
Fixed Costs (Table VIII)	752	0.5874**
Total Milk Sales (Table IX)	412	0.5318**
Gross Returns (Table IX)	743	0.5521**

The "a" indicates the level of Y at X = 0 (the point of interception on the Y axis). $A = Y - BX$. The "b" is the coefficient of regression (slope or amount of change in Y). $B = SXY/SX^2$. Stars (**) indicate statistical significance of the coefficient at the one per cent level of probability.

VITA

The author was born on a farm near DeRidder, Louisiana on February 28, 1920. In 1926, the Anderson family moved to Doyline, Louisiana where he obtained his elementary and high school education. He graduated from the Doyline High School in 1936.

After working one year in the Sanitary Dairy in Minden, Louisiana, the author enrolled in L.S.U. in 1937 and obtained a B.S. degree with a major in Dairying and minor in Animal Husbandry in 1942. He served as a student dairy employee during his undergraduate work and in 1939, was employed by The Borden Company in their "Dairy World of Tomorrow" exhibit at the New York Worlds Fair.

Immediately after graduation in 1942, the author entered the Army of the United States as a private and was discharged in 1946 as a first lieutenant after service in the South Pacific Theatre.

He then enrolled in the Graduate School at L.S.U. and obtained a M.S. degree in 1947 with a major in Dairying and a minor in Agronomy.

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EXAMINATION AND THESIS REPORT

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